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CONTENTS.

An Asterisk (*) denotes an illustrated article.

EDITORIALS—

Volume XXXVIII	1
Seventh Annual Meeting of the Society of Gas Lighting	1
The Petroleum Outlook	2
Electric Lighting Companies in England	3
Fireproof Architecture	3
Ohio Coal Mining	3
The Munich Generator Furnace	3
Proceedings of Tenth Annual Meeting of the American Gas Light Association*	4
Protecting the Gas Consumer	10
New Safety Lamp	10
The Equitable Gas Light Company, of New York	11
An English Gas Exhauster	11

CORRESPONDENCE—

Experience with Patent Processes at Norfolk, Va	11
Letter from Mr. Pratt	11
The Future of the Gas Business	12

VOLUME XXXVIII.

With the present issue we begin a new year, and we extend to all our patrons and friends far and wide, as well as those close at hand, the very best wishes for their prosperity during the coming year. In reviewing the past it is doubtless easy for most of us to recognize many points wherein we have not been fully up to the mark in the performance of the full requirements of duty. Happy will be the man who, bearing this in mind, avoids shortcomings in the same things in the future.

So far as we are concerned we are perfectly well aware that this JOURNAL does not yet come up to the standard which it ought to be governed by. Whatever may be said in our favor there is much that can be justly said that we leave undone; but here we would ask if our critics have done all of their part in making the JOURNAL such a gas man's paper as it ought to be—filled with every item of interest relating to any gas company anywhere. How many have taken the trouble to supply information which they alone could furnish in a reliable form? How many have taken the trouble to send us the local daily, *marked* with the little item which concerned the gas interest? In cases of controversy, involving important principles in the prosecution of the gas business, how often have we been furnished facts, even when applied for? How often have our friends taken the trouble to send us the name of one or more new subscribers? How often do men, in position to do otherwise, send the JOURNAL round from hand to hand instead of subscribing for several copies? How many companies are there in which every director is supplied with a copy, as he ought to be?

In reply many will say that it is the business of the management of this JOURNAL to secure all these advantages. This may be true, but we doubt it. Every effort is made on the part of the management to give to the gas world the best possible paper consistent with the income which the gas world gives us in return. Every dollar received is put into the paper, barely leaving a living allowance to the owner.

Now, it is well known that by advertising we thrive; and if anyone desires to promote the best interest of the JOURNAL let him see to it that those from whom he purchases his supplies are advertisers in the JOURNAL. If every gas company manager would do this it would place us at once in a position to have able correspondents at all the principal points, to employ scientific talent, for the purpose of making original research and presenting original matter, to illustrate freely all new and valuable improvements, and, in fact, to bring the paper to the point where it ought to be.

But we are not a philanthropic institution, and, though willing to spend what we get for the public welfare, we must be pardoned if, compelled to draw the line somewhere, we draw it just behind the last dollar, and look with hope and fond reliance upon our friends and patrons to place the location of that article as far from us as possible. This is a reciprocating, co-operating kind of business after all—not quite enough of it to dispense entirely with advertisers and subscribers, but too much of it to be thrown away entirely. There was never a year commenced with brighter prospects for the gas industry; and we trust that its close will find us all further along on the road to the goal which every gas man toils for—an increased consumption and a larger net profit.

Seventh Annual Meeting of the Society of Gas Lighting.

The VII. Annual Meeting of this Society was held at the 18th street station of the Manhattan gas works, in this city, on the 21st ult. There were 16 members present. The election of officers for the ensuing year resulted as follows—

President—J. R. Thomas, of Williamsburgh, N. Y.
Vice-President—C. V. Smith, of New York city.
Treasurer—J. H. Armington, of Brooklyn, N. Y.
Secretary—G. W. Dresser, of New York city.
Member on Executive Committee—Eugene Vanderpool, of Newark, N. J.

After the transaction of the usual routine business the reports of the various officers were read. During the year one member has died—Mr. George Dwight, of Springfield, Mass; the names of three members have been added to the roll.

During the progress of the meeting one of Dr. C. W. Siemens's gas and coke regenerative grates was exhibited in operation. This device has been fully described in these columns, and was devised by Dr. Siemens as a means of abating the smoke nuisance in London. While we do not require such an appliance for the purpose of abolishing smoke in our Eastern cities, still there are many places west of us where its introduction would be a desirable thing on this account. With about one-half bushel of coke, and 60 to 100 feet of gas a most superb smokeless fire can be maintained for ten hours. The working of the grate was a perfect success.

Besides this valuable contribution to the gas world by Dr. C. W. Siemens, the Society were shown another invention, by Mr. Frederick Siemens, of Dresden, a brother of Dr. C. W. Siemens; and this was the much talked-of and much abused Siemens burner. Many managers have failed to get any good results from burners of this kind heretofore imported; and the reason for this was simply that the burners sent here were constructed for gases of much lower illuminating power than is generally made here. Mr. Frederick Siemens's Engineer (Mr. C. Max Herrmann, of Dresden), has recently arrived in New York with some burners especially adapted to gases of the qualities made here, and the results show perfect success.

A paper was read before the Society, by Mr. A. M. Smith, of the Manhattan Gas Light Company, which gives the exact results obtained.

One fact is worthy of notice in these results, viz., that the larger the quantity of gas burned the greater is the number of candles obtained per foot of gas. How far this holds good cannot now be stated; but on one thing there was no difference of opinion, and that was that no single electric light exhibited here could equal in brilliancy, efficiency, and diffusive power the 500 candle burner which was in use, and consumed from 50 to 55 feet of gas. The full results will be found in the following paper, as determined by careful photometrical tests—

Improved Gas Burners.

A Paper read before the Society of Gas Lighting, Dec. 22, 1882, by A. M. Smith, of the Manhattan Gas Light Company, of New York City.

About a year and a half ago our expectations were raised very high by reports received from France as to the success obtained there in developing a much larger amount of light from a given quantity of gas than had been possible before.

This was accomplished by a burner constructed on the regenerative principle and was the invention of Mr. Frederick Siemens, of Dresden.

Quite a number of these burners were imported from France by several companies, and greatly to the disappointment of those who had bought them when tested here the burners failed to give with our gas the same or even similar results to those obtained in France. There was no doubt that the results reported were actually obtained in Paris, nor was there any more doubt that the same results were *not* obtained here. Investigation led to the conclusion that the difficulty was in the arrangement of the air supply, which was not adjustable, or so arranged as to meet the varying conditions resulting from the use of gases of different illuminating power. The Paris gas being about 12 or 13 candles, it follows that a burner arranged for that gas would not be suitable for a gas of 20-candle power. The same trouble exists with some other large burners, unless special care is taken to have them constructed for the higher illuminating power of our gas here, they will fail to give the results expected of them.

So far as the burners under consideration are concerned, Mr. Frederick Siemens has taken this matter in hand, and has now perfected his burners so that they meet the requirements of the case, and give results which confirm the good reports made upon them in Paris, and other places on the Continent.

During the past month a series of these burners have been tested at this station, under the direction of the Engineer of the Company, by Mr. C. Max Herrmann, assisted by the writer. The burners tested may be described as follows—

No. 1. A 500 candle burner, consuming from 50 to 60 cu. ft. per hour.
No. 2. A 200 " " " 25 to 35 " "
No. 3. An 80 " " " 15 to 20 " "

The makers designate the same burners as follows—

No. 1.—1,800 to 2,000 liters consumption; or 350 to 450 candles—German standard.

No. 2.—900 to 1,000 liters consumption; or 150 to 200 candles.

No. 3.—450 to 500 liters consumption; or 80 to 100 candles.

The specific gravity of the gas being about .44.

Having carefully standardized a Sugg's "G" burner (33-hole Argand) a careful series of tests were made, which gave the following results—

Test No. 1.

This test was commenced rather prematurely, as the old gas in the pipes and test meters was not thoroughly burned out, and was made 20 minutes after the Frederick Siemens burner was lighted.

The Sugg standard burner ("G," 33-hole Argand) consuming seven feet of gas, under .55 pressure, gave an illuminating power of 25 candles, or 3.57 candles per cubic foot of gas burned per hour.

For testing the Siemens burners the distance between the lights in each case was 120 inches.

The Siemens burners, No. 1, with a gas consumption of 51.06 cubic feet per hour, and a pressure of one inch at outlet of test meter, gave a light 13.08 times greater than the standard, or $13.08 \times 25 = 327$ candles. Hence the duty of the burner was $327 \div 51.06 = 6.4$ candles per cubic foot of gas consumed.

Test No. 2.

Siemens No. 1 burner, after burning 50 minutes. Same standard burner, with same pressure and consumption as in test No. 1.

Before commencing this test a marked improvement was noticed in the gas, and consequently the Sugg burner was carefully tested again, and it was found to give 30 candles, with consumption of seven feet, and pressure of .55 inch, or 4.28 candles per foot of gas consumed per hour.

No. 1 Siemens, with consumption 51 cubic feet, pressure one inch, gave 16.86 times more light than standard—$16.86 \times 30 = 505.8$ candles, or 9.91 candles per cubic foot of gas consumed per hour.

Test No. 3—*Siemens Burner No.* 2.

Siemens burner No. 2 (tested against the same standard, giving 30 candles) consumed 26.8 cubic feet, under one inch pressure, and gave a light 6.4 times greater than the standard, or $6.4 \times 30 = 192$ candles, which is 7.16 candles per cubic foot of gas consumed.

Test No. 4—*Siemens Burner No.* 2.

The same burner, under the same conditions as regards the standard, consumed 27 cubic feet per hour, with one inch pressure, and gave a light 6.95 times greater than the standard, or $6.95 \times 30 = 208.5$ candles, which is 7.72 candles per foot of gas.

Test No. 5—*Siemens No.* 3.

Standard burner consumed 7½ cubic feet per hour, and gave light of 30 candles, under half inch pressure, or four candles per foot of gas consumed.

Siemens No. 3, after burning 15 minutes, consumed 13.2 feet, with one inch pressure, and gave light 2.41 times that of the standard—$2.41 \times 30 = 72.3$ candles, or 5.477 candles per foot of gas consumed. The same burner, after burning 50 minutes, consumed 14.28 cubic feet of gas, under one inch pressure, and gave a light 2.878 times that of the standard, or $2.878 \times 30 = 86.34$ candles, which is 6.04 candles per cubic foot. This last test was No. 6.

Recapitulation.

No. of Test.	Siemens Burner.	Gas Consumed per Hour.	Candle Power.	Candles per Foot of Gas Consumed.	
1	No. 1	51.06	327	6.4	Lighted 20 minutes.
2	No. 1	51.00	505.8	9.91	" 50 "
3	No. 2	26.80	192	7.16	
4	No. 2	27.00	208.5	7.72	
5	No. 3	13.2	72.3	5.48	Lighted 15 minutes.
6	No. 3	14.28	86.34	6.04	Burning 50 minutes.

The Petroleum Outlook.

The situation in the petroleum fields has not materially changed during the month of November. The average daily production was somewhat reduced during the month of October; by referring to our tables published in this issue it will be seen that the production for October was 74,118 bbls. per day, and for November 73,098 bbls. per day, being 1,020 bbls. per day less in November than in October.

The pipe line runs from the wells were 73,000 bbls. in round numbers per day, for the month, which is the smallest average run for any previous month in the past year, indicating that the surplus stock which has been accumulating for a long at the wells is now practically being exhausted, and in the future the pipe line runs will approximate nearer the actual production than for many months previous.

The shipments out of the producing region for the month were 1,401,640 bbls., which is the smallest amount shipped in any month since April, 1881.

The increase of stock during the month was 688,300 bbls. making the total amount at the close of the month 33,728,555 bbls. against 25,509,285 bbls. at the close of the corresponding month in 1881,

The new work for the month in drilling new wells and building new rigs has been slight compared with the same time in former years ; in November, 1881, there were 993 drilling wells and rigs building, while this month shows only 299 drilling wells and rigs building.

In the Allegheny, N. Y., district there has been nothing new developed during the month except several small wells and a few dry holes, with a downward tendency in the amount of production. The production in the Bradford district also seems to be on the wane, gradually, yet surely, and the same may be said of Cherry Grove and the whole of the Middle or Warren field. In the Southern or Lower district there are only two points of interest in regard to production, the one is the Cranberry district near Oil City, where there are three good producing wells yielding about 100 bbls. each per day, the other is the Bald Ridge locality in Butler county, which shows up with some three or four wells which are considered good for about 100 barrels each.

The sales and resales of crude petroleum during the month have been excessively large at the four principal oil exchanges. Pittsburgh Oil Exchange sold 81,733,000 bbls., Oil City Exchange 172,441,000 bbls., Bradford Exchange 111,764,000 bbls., New York Exchange 20,774,000 bbls., making the total sales 386,712,000, equal to selling the whole stock of oil on hand at the close of the month eleven times over.

The price of crude oil during the month ranged from 94¼ to 1.30 per barrel, averaging 1.14 cents for the month, which is the highest average since December, 1879.

At this writing (Dec. 18th) the trade is looking with great interest to a new well of Grandin brothers, located at Balltown, Forest County, which was drilled to the top of the sand some six months ago, and has been producing some 40 bbls. per day from that time to the 12th of this month, when the owners drilled it through the sand, which caused it to commence flowing from 1,000 to 1,200 bbls. per day. There are two other wells now drilling in the same vicinity which are regarded with great interest by the trade as they will have a tendency to establish the price of crude either above or below the present ruling price should they come in large producers or dry holes.

Since writing the above the Reno Company's well in Forest county, some 8 to 10 miles in an easterly direction from Balltown, has come in and started off with a production of about 150 bbls. per hour, and is considered good for 1,800 to 2,000 bbls. per day for some time to come. The effect on the crude market has been very disastrous ; the selling price just before the well commenced flowing was 97½ and 98 cents per barrel, which immediately commenced to decline, and run down in about four hours to 83½. Since then the market broke to 75 cents, with a bearish feeling on all sides. It is now feared by the trade that another Cherry Grove deluge is about to be opened up.—*Petroleum Reporter.*

Electric Lighting Companies in England.

That "all is not gold that glitters" is shown from the proceedings in one of the English courts, on which the *Journal of Gas Lighting* makes the following comments—

"A crushing blow has fallen upon the Brush concessionary companies, the probable effect of which will be to break up the entire fleet. On December 8th Justice Chitty had before him an application by a shareholder in the Great Western Electric Lighting and Power Company to have his name struck off the register of proprietors, and the money paid in respect of his shares returned, on the ground of misrepresentation in the prospectus. We have already commented in these columns upon the nature of this inaccuracy, which consists in claiming an exclusive license for the Lane-Fox incandescent lamps, whereas there was really a prior assignment of this valuable (?) property to another and independent electric lighting company. Several of the concessionary Brush Companies fell into this blunder, and all of them are now in trouble on the same score. We have already observed how, in consultation with their constituents, the Directors of these similar concerns practically agreed in describing the Lane-Fox patents as worthless, and the representations in the prospectus relating to them as consequently unimportant. The same argument was used on December 8th before the learned Judge in the Chancery Division, but with most disastrous results. With strong common sense, as well as with legal acumen, the Judge decided that it was not competent for persons who had issued a prospectus which from beginning to end had recommended as one of its leading attractions this particular invention, to afterwards say, for the purpose of upholding their prospectus, that the invention was of little or no value, and therefore not a chief attraction in the document in question. The application was granted with costs ; the sums paid for the shares to be returned to the applicant by the Company. As these shares were probably allotted at par, and are now at a hopeless discount ; and as there are numbers of other disappointed speculators ready to seize a chance for backing out upon similar terms, the condition of the Brush companies altogether is not to be envied.

"While the subsidiary Brushes are almost in *articulo mortis* the great parent concern is supposed not to be free from embarassment. In the early part of August last the company declared an interim dividend of 100 per cent.; and it was also announced that there was a great reserve of cash to meet contingencies. Yet in the brief space of four months after this high water mark had been recorded, a call of £3 per share has been made, which is calculated to amount to £81,000. The quoted value of the partly-paid shares still keeps at a very respectable figure ; but it is asserted, by presumably well-informed persons, that 'the market is only sustained by the process of underpinning on the part of those whose present interest it is not to let it down with a flop.'"

The Munich Generator Furnace.

The *Journal of Gas Lighting*, in speaking of the latest results obtained by the Schilling generator, says—

"In another part of the present issue is given an illustrated description of the latest form of regenerative gas furnace for retort settings, as perfected by Dr. Schilling and Dr. Bunte, at the Munich gas works. It is unnecessary here to say anything in commendation of the work of these scientific gas engineers to the particular attention of the the readers of the *Journal*. To these gentlemen especially, and to a select few of their compatriots and colleagues, belongs the credit of establishing on its present basis the great modern reform in carbonizing plant. It is true that the renown of the discoverer, in this matter of gaseous firing, is one of the glories of the house of Siemens; but it is equally true that if the working out of the system for ordinary gas works had not been taken up by others, the Siemens principle would have made little headway in this direction. The more remunerative applications of gas furnaces on a grand scale in metallurgical operations had, in fact, withdrawn attention from the advantages which might result from its modification for gas retort settings. It has been the more humble, but still most useful task of the two German specialists whom we have already mentioned, to show by theoretical analysis and practical example, that gaseous furnaces of comparatively small size partake of the advantages of the larger class of the same apparatus. A study of the present example will teach, among other things, the exact meaning of the word "regeneration" as applied to furnaces. This is the only instance, so far as we are aware, in which the process just named is applied to all the air used for combustion. And special attention may also be directed to a weighty observation of Dr. Bunte's whereby he expresses the net result of the regenerative process. Whatever may be the economy of gaseous firing, in comparison with simple furnaces, Dr. Bunte points out that with the necessity for allowing the products of combustion to leave the retort setting at a high temperature, there must be 64 per cent. of the total heating value of the fuel also carried away. All this is lost if there is no regeneration ; but in the present example the spent gases depart to the main flue with only 25 per cent. of the heat which they originally possessed.

"Thus the most perfect regeneration yet attempted in connection with retort furnaces results in a saving of 39 per cent. of the heat of the fuel. And what is necessarily allowed to escape in the main flue is not altogether lost ; for at Munich this last 25 per cent. of the heat of the coke consumed for carbonizing is made to generate all the steam required for the ordinary service of the works. Such thoroughly practical science as this deserves the widest possible recognition."

A description of the furnace will appear hereafter.

Fireproof Architecture.

The *Scientific Press* points out that an immense amount of harm has been done by the current notion that in order to make any structure fireproof it must be incombustible. This idea, we think, has been one of the leading reasons which has prevented steamboat men from attempting to make the upper works of our river steamers fireproof. The fallacy of the idea is easily seen when we consider that cast-iron buildings have been utterly destroyed by fire, and that wooden buildings have had whole floors burned out without injuring portions of the building above or below. What is needed is a structure which will resist fire, and this can be easily obtained in wood.

A wooden shutter carefully covered with tin withstands the effect of fire longer than one of iron, and if the principle of the tin-covered shutter can be adopted in certain parts of the joiner-work of our river steamers, they can be rendered so far fireproof that when flames break out around the boilers, near the engine, or in the freight, the fire will spread so slowly that it may be controlled.

Ohio Coal Mining.—The report of the State Inspector of Mines in Ohio, for the year ending June 30, 1882, shows that the annual production of coal from the mines of that State amounted to 9,450,000 tons, being an increase over the output of 1881 of upwards of one million tons. He places the undeveloped coal resources of Ohio at 85,000,000,000 tons.

[Official Report—Continued from page 280.]

Tenth Annual Meeting of the American Gas Light Association.

Held at the Monongahela House, Pittsburgh, Pa.,
October 18, 19, and 20, 1882.

Second Day—Morning Session—October 19.

Continuation of the Discussion on Regenerator Furnaces.

Mr. McElroy—I erected a regenerator furnace and ran it for about 6 months in close comparison with my present settings, and found that it would not pay one per cent. on its cost. I abandoned it, and came back to my old settings. I have been taking three benches, one about medium and one just fired, and have averaged the three benches in order to get a good average result. I have used 18.2 pounds of coke to 100 pounds of coal with my present setting, and can do that the year through. I do not see that any of you have obtained any better results, except in the quantity per mouthpiece. That is certainly a benefit to the regenerator; but I can do the same thing.

Mr. Littlehales—Have any of you gentlemen who have been experimenting tried the method adopted by Siemens, of making one furnace to generate carbonic oxide, with which to heat a number of benches, and thus avoid the expense of separate furnaces for each bed?

Mr. Greenough—Mr. Siemens is not doing anything of that kind now. That was his original plan; but he has now apparently abandoned it for better plans. He is not doing that either in Paris or in Glasgow.

Mr. Weber—There never were any built upon that principle except in Paris.

Mr. Starr—I have been glad to listen to this discussion on regenerator furnaces. I am just building three of them, and I confess that I fear I may have trouble from clinkering. I do not see why you cannot regulate the heat of the furnace, either by the admission of air below the grate bars, or by the admission of air by the side of the furnace, near the retort. The plan that I propose to use will give me a grate surface 14 or 15 inches wide, and about 2 feet long. I do that in order to have a short furnace, and one that will be easily clinkered. If there is any danger in that, or if any gentleman has tried it, I would like to hear his experience. I do not want to get plugged up in the winter time. I am running pretty closely up to the capacity of my retorts and services, and want to go through safely.

Mr. Weber—You need not fear. You can carry the heat just as you want it; it is all in your own hands. You can carry it from 1,600 to 3,200 degrees, and you can readily control it.

Mr. Greenough—I would like to ask Mr. McElroy about his extraordinary statement of using 18.2 pounds of coke to 100 pounds of coal. That is the biggest story I have yet heard.

Mr. McElroy—I weighed my coke for 24 hours, and also weighed my charges used in these benches.

Mr. Greenough—What were the figures?

Mr. McElroy—They were 18.2 pounds of coke per 100 pounds of coal.

Mr. Greenough—How did you arrive at that result?

Mr. McElroy—By the quantity of coal burned off in 24 hours. In a bench of sixes it was 6,600 pounds of coal, or 100 pounds to a retort.

Mr. Greenough—What is the size of your retorts?

Mr. McElroy—They are 14 x 22. At that time we were running the small charges in order to keep the retorts in action.

Mr. Starr—Do you mean 18.2 pounds of coke to 100 pounds of coal?

Mr. McElroy—I mean that 18.2 pounds of coke carbonized 100 of coal; or 25 per cent. of the coke made.

Mr. Greenough—What was the weight of the coke?

Mr. McElroy—I have not got that here. The coke is taken as it drops upon the floor, and is ready for sale. It is just such coke as we sell. It is good, clean coke, and with no breeze. It is not measured by bushels, but by weight. Our superintendent measured it in bushels, and I had it weighed.

Mr. Greenough—Then I understand that you took the coke out and saturated it, and got 4,800 pounds, and then put 1,200 pounds of that same coke into the furnace.

Mr. McElroy—Yes, of that same coke.

Mr. Greenough—Had not some of the water run off of that coke before you put it in? The coke would dry considerably in 24 hours.

Mr. McElroy—We are always using the coke from the floor. Of course we would not make coke in the morning for the fire in the evening. The coke would be upon the floor for an hour or two before it is used or thrown into the furnace.

Mr. Greenough—Have you a high chimney?

Mr. McElroy—No; it stands about four feet above the benches. Our bench is a common open settting. I took the three benches so as to make a fair average. I did not take a good bench alone. One of the benches was one that I was going to leave out that week. I fired those three benches, weighed the charges and the coke, and divided the result by three.

Mr. Forstall—Were those ordinary furnaces?

Mr. McElroy—Yes, sir.

Mr. Greenough—Did you get any different results when running heavier charges?

Mr. McElroy—I only made one experiment, and that was for the purpose of determining whether I should go on with these furnaces or abandon them.

Mr. Greenough—How many charges did you put into the retorts?

Mr. McElroy—I charge every four hours.

Mr. Pratt—Are your settings what are called the Gardner settings?

Mr. McElroy—Yes, they are known by that name. It is the Farmer plan of setting, but is made in Pittsburgh. They are different from the Pittsburgh settings. These are old retorts that are used here, and they are on the plan of the Farmer retort.

Mr. Pratt—Are these settings similar to those used at Newport?

Mr. McElroy—At Newport Mr. Stedman is using the same setting, but is using a different retort; and the setting conforms to the shape of the retort.

Mr. Anderson—The bridge wall settings are not exclusively a Pittsburgh setting; in fact they are an old English setting. They are used largely in the West.

Mr. Greenough—In regard to these figures of Mr. McElroy there is this to be noticed—the percentage of coke which they obtained to 100 pounds of coal is 73 per cent. by weight. This is a trifle larger than the ordinary estimate as to the quantity of coke produced from 100 pounds of coal. I noticed that his heats are very low. In a retort of that size—14 x 22—I think that 200 pounds of coal is an extremely light charge. I am curious to know whether, in case his heats were higher, and he were running a fair charge of 250 pounds to the retort, he would not find his higher heat obtained with a larger percentage of coke. I notice from the English reports that the percentages of the coke there used have been smaller, and that their heats have been low. Whether it is possible to obtain higher heats without the use of larger percentages of coke in proportion to the amount of coal carbonized, I am curious to know by experiments. I wish Mr. McElroy would make some figures as to the consumption of coke in that furnace when using higher heats.

Mr. McElroy—We carbonized 6,600 pounds of coal, and got 4,800 pounds of coke; which gives a result of 72.727.

Mr. Pratt—How much gas does that 6,600 pounds of coal yield?

Mr. McElroy—I have not got the memorandum, but the yield was 4.60 to the pound that day.

Mr. Harbison—What kind of coal was used?

Mr. McElroy—Pittsburgh and Youghiogheny coal.

Mr. Littlehales—Do you use chimneys to your benches?

Mr. McElroy—No; we have a continuous chimney along the top of the benches, and through that are the flues. We discharged the smoke right into the retort house. We have a small chimney about 4 feet above the top of each bench. There is a flue upon each side, 9 x 9, running through the center wall.

Mr. Hyde—I would like to state that during the last year we have used 91 bushels of coke to carbonize one ton of coal. We obtained the measurement in this way: I have tested the coal repeatedly, and find that about 60 pounds of coal make a bushel of coke. We do not weigh the coal or measure it, but we estimate it in that way—allowing 60 pounds of coal to a bushel of coke. When we keep an account of the coke used, we charge our figures up in that way. The run for the year ending October 1st was 91 bushels.

Mr. Greenough—That is estimated on the basis that each bushel of coke weighs 60 pounds?

Mr. Hyde—On the basis that 60 pounds of coal make a bushel of coke. That bushel of coke weighs about 37½ pounds. That would give 17 pounds of coke to the 100 pounds of coal carbonized. That is less than Mr. McElroy's figures.*

Mr. McElroy—What settings are you using?

Mr. Hyde—The common bench settings—the Cleveland settings. It is an old style of setting, and we have made some changes in it.

Mr. McElroy—I think that if you do not estimate your coal, but weigh it, I would hold you level.

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* Cleveland, Ohio, Nov. 13, 1882.

To the Editor of the American Gas Light Journal:

I wish to make a statement through your journal to the members of the American Gas Light Association who were in attendance at the recent meeting at Pittsburgh. In answer to a question by Mr. Greenough, of Boston, I stated that at our works, during the past year, we used for fuel under benches 36.8 per cent. of the coke made in 9 benches, and 36 per cent. in 8 benches. I find that I was in error. I should have stated that 27.2 per cent. of coke made in 9 benches was used for fuel, and 27.8 per cent. in 8 benches. The foregoing will explain the deviation in the report of the proceedings from the statement I made.

Yours respectfully,

G. A. Hyde,
Eng. Cleveland Gas Lt. & Coke Co.

Mr. Hyde—I have repeatedly made tests by taking the absolute weight of the coal and measuring the coke; and I find that 60 pounds of coal will make a bushel of coke, and that the coke, weighing it in the ordinary way, as soon as it is drawn, weighs 37½ pounds. My estimate is just as correct as if I had weighed it. The statement is correct; there is no gueswork about it. I made the measurements, so that when I am told that so many charges of coke are used, I can figure it up upon that basis.

Mr. Coggshall—What is your yield per pound of coal?

Mr. Hyde—About 5 feet.

Mr. Coggshall—How heavy are your charges?

Mr. Hyde—250 pounds.

Mr. Coggshall—What is the size of your retorts?

Mr. Hyde—They are 13x24x9.

Mr. Greenough—I would like to call attention to the fact that whereas Mr. McElroy, from 100 pounds of coal, makes 73 pounds of coke, you, from 100 pounds of coal, make only 60 pounds of coke. Therefore you do not make within nearly 13 pounds of the amount of coke per 100 pounds of coal that Mr. McElroy obtains.

Mr. McElroy—I think that if he would weigh his coke he would get a slightly different result, perhaps.

Mr. Hyde—I have weighed it, and 60 pounds of coal make 37½ pounds of coke.

Mr. McElroy—I think if we took the same plan of measurement my figures would be below his.

Mr. Anderson—What coal did you use?

Mr. Hyde—The Youghiougheny.

Mr. Burtis—Do you know the number of cubic inches in your bushel?

Mr. Hyde—It is the regular heaped bushel. I have had the State seal a bushel, and then made a box and heaped it. I call 1.65 cubic feet of coke a bushel. That is the actual cubical contents.

Mr. Burtis—Do you not mean 1.55?

Mr. Hyde—No; I mean 1.65.

Mr. Burtis—Then you go over the regular bushel?

Mr. Hyde—That is the way we measure and sell our coke.

Mr. Littlehales—With reference to this fuel question, I dare say that some of you will remember that last year, when discussing it, I referred to the question of chimneys. One gentleman considered that they were altogether useless; others would not dispense with them. I am satisfied from my experience that no man can heat his retorts as economically without chimneys as with them. If you go into a retort house which has no chimney, you will find a flame of carbonic oxide gas extending two or three feet above the top of the benches. What does that mean? It means that a part of the fuel has been conveyed to the top of the benches, and is there being consumed where it is doing no good; whereas it should have been consumed before leaving the retort. If you have a chimney drawing a large draught of air, the carbonic oxide gas will be used in the chimney to do some work.

Mr. Starr—You will lose the draught of your furnace even with a high chimney, unless the chimney is of proper shape. It is well known that a 6-inch round stove-pipe gives a better draught than an 8-inch square pipe. The correct shape gives a better draught. I have tried to remedy my draught by putting in a round flue. I hope to dispense with the high chimney by having a better draught.

The President—In connection with this matter I desire to call the attention of the members to the resolution passed in October, 1881, fixing the measure of a bushel at 2,747 cubic inches. It was understood at the time that resolution was adopted that in all future discussions pertaining to this subject the same standard should be used by all, so that the results of experiments which might be given here could be the more readily compared. Please remember, therefore, that a bushel means 2,747 cubic inches.

Mr. Starr—In the western country 2,688 cubic inches make a bushel.

Mr. Hyde—I mean to say that the coke itself measured 1.65. I do not mean to say the measure was that, but that the coke actually measured that.

Mr. Greenough—How many bushels of coke do you sell per ton of coal carbonized during the year?

Mr. Hyde—I cannot answer that without figuring. The result of the sale is 66 pounds of coal per bushel. That is, it takes 66 pounds of coal for the year to make one bushel of coke. That is throwing out the waste.

Mr. Greenough—What do you calculate will be the production per ton of coal, in bushels of coke, and what proportion of that do you sell?

Mr. Hyde—We sell 30 bushels per ton of coal carbonized—that is, 2,000 pounds to the ton.

Mr. Greenough—A bushel of what size?

Mr. Hyde—It is the ordinary United States bushel.

Mr. Starr—That is 100 cubic inches more than our standard bushel. If he sells 30 bushels of that it is a very large yield of coke. Do you sell 30 bushels per ton after using what is necessary to keep up the fires?

Mr. Hyde—No; but sometimes we sell it all.

The President—Then how do you keep up your fires?

Mr. Hyde—Sometimes we run a whole year without using any coke at all.

Mr. Greenough—And you only make 30 bushels of coke to the ton of coal?

Mr. Hyde—That is what we sell per year.

Mr. Greenough—Then your production, for the short ton of coal, you calculate to be only 30 bushels.

Mr. Hyde—That is for sale after the breeze is taken out. If we were to use it in the retort house we would call it 60 pounds off coke to the ton. There is a difference between taking the coke right o the retort house floor and putting it into the furnace, and stacking it up and breaking it and selling it. If you put it all into the furnace then, it would be 33⅓ bushels.

The President—In other words, you get 30 bushels of screened coke, or 33 bushels of coke and breeze?

Mr. Hyde—Yes.

Mr. Greenough—Do you get that estimate from actual figures, or do you estimate the production of coke as so much per ton for the quantity of coal carbonized, and then estimate what you sell?

Mr. Hyde—We take it in this way: I have made a scale of the number of bushels to a charge of 175, 200, 225, and 250 pounds of coal. At the close of each day the man reports that so many charges of a certain weight have been used. I fix it upon that basis, by estimating that 60 pounds of coal will produce so much coke. This method has been proven to be correct by careful measurements, not only as to single charges, but I have also taken a ton of coal, and put it into the retort, and drawn it out, and measured it carefully. I made my calculations on the basis that 60 pounds of coal will make a bushel of coke weighing on the average 37½ pounds.

Mr. Greenough—Is this coke hot or cool when measured?

Mr. Hyde—It is coke that has been drawn and quenched with water.

Mr. Greenough—According to all the figures that I have ever made on the evaporation of volatile substances from coal, you should get at least 66 per cent. of fixed carbon from your coke. But even including water, you only give us 60 per cent. as the quantity you obtained. I cannot see how you can take so little coke out of your coal.

Mr. Hyde—In measuring the coke, I always shake the box a little, so as to have it a substantial measure. The coke is light, of course. There is only water enough put on to quench it. Did Mr. McElroy take his coke out of a heap that had been standing some time?

Mr. McElroy—We draw the coke from the mouth of the retort and let it drop to the floor beneath. I suppose that it will average a perpendicular drop of 16 feet. That breaks it up considerably. We fork it over that floor, put it in barrels, and carry it up stairs to fire with. What we sell is hauled out of the cellar.

Mr. Hyde—How do you measure it?

Mr. McElroy—We weighed it; it did not go by measure, but by weight. Our superintendent made his calculation in bushels, while I made mine in pounds. My unit is always the pound, as being more easily understood.

Mr. Hyde—Our quantities of coke are very much the same.

Mr. McElroy—If you would get the same amount of coke reduced from the coal, I think your figures would exceed mine. If your reduction of coke per ton of coal would equal mine, I would figure below you in heating.

Mr. Nettleton—I think that in a conversation with Mr. Hyde he told me he used a certain percentage of the coke.

Mr. Hyde—Yes; last year we used 36 per cent. of coke.

Mr. Nettleton—In the East, a number of companies, my own among the number, say that, from the best American caking coals, they produce 42 bushels of coke per gross ton. On that basis, Mr. Hyde would have used, at the rate of 36 per cent., 15.12 bushels of coke to have carbonized one ton of coal.

Mr. Hyde—Do you shake your coke down at all, or put it in as loosely as you can?

Mr. Nettleton—I use an iron measure with a diameter of 23½ inches, and a height of 19½ inches. When that is struck it holds three heaped United States bushels. That is the measure that is used by the large New York companies in selling their coke, and I think it is used by a majority of the English companies.

Mr. Starr—How many cubic inches does it contain?

Mr. Nettleton—I cannot tell you that.

Mr. Helme—We all know how hard it was last summer to reconcile difference of statements and calculations. We have passed a resolution, as stated by the President, fixing a standard bushel. The calculations which are presented here, based as they are upon different bushel measures, exceed my ability to comprehend them.

The President—The time has arrived for adjournment under the rules adopted by the Association.

Mr. Helme—Before adjournment I desire to offer a resolution and a word upon a different subject. No doubt many of you have noticed the absence of a member of the Committee of Arrangements, Mr. William Gardner. His absence is caused by a very sad bereavement. He had a very promising son

of about 20 years of age, who, on Sunday evening got on the train at the depot to go to his home; but in getting out of the car he fell under the wheels, and in three hours he had gone to that bourne whence no traveler returns. To those of us who knew him and his father and mother intimately, it was a sad blow on arriving here to receive this intelligence. I mention this for the purpose of informing those who may not know the cause of Mr. Gardner's absence.

The Secretary—In anticipation of the announcement which has been made by Mr. Helme, I have prepared and now offer the following resolution:

"*Resolved*, That the American Gas Light Association learns with sincere regret of the accidental death of the son of Mr. William Gardner, of Pittsburgh, and extends to their fellow-member the assurance of their sympathy with him and with his family in their sudden affliction."

The resolution was adopted by a standing vote, and the Secretary directed to communicate the same to Mr. Gardner.

A recess was here taken until 2 o'clock.

AFTERNOON SESSION.—OCT. 19.

The Association reassembled at 2 P.M.

The President—At the time of adjournment we were upon the subject of regenerator furnaces. I understand that Mr. Slater has had some experience in their use, and, before passing to other subjects, the Association would be glad to hear from him.

Mr. Slater—I did not come prepared to give you any special information about the Dieterich furnace. At the Boston meeting of the Association, last fall, I presented a paper which gave the results in detail down to that time. If the gentlemen desire to ask any questions, I will be glad to answer them from memory as far as I can.

Mr. Harbison—I think if Mr. Slater would state to the Association in a general way what his experience has been up to this time, even if he did repeat what he said in Boston, it would be agreeable to the members. He had had considerable experience up to that time, and since that time he has been engaged in enlarging and rebuilding his works. If he will state what he has done with reference to the furnace in the new station, it would be pretty good evidence of what he accomplished in the old, and as to the success which has attended the use of his furnaces. I think that will open the way for questions which will bring out a good deal of valuable information.

Mr. Slater—Perhaps I can give some results of the first six months of this year which will be of interest. During the first six months of this year we carbonized at that station 20,041,332 pounds of common caking coal, furnished by the Westmoreland, Penn, and Youghiogheny companies. In addition to that, we used 439,600 pounds of cannel coal, making 20,480,932 pounds of coal in all. The average yield of that, for the whole time, was 10,622 feet per ton, or 4.74 to the pound. The greatest yield during that time was 11,678, or 5.21 per pound. The average yield per retort was 10,313; the greatest yield was 12,016. Of course, you understand that we ran the Dieterich furnace with 3-hour charges. The average number of pounds per charge during the whole six months was 270 pounds every 3 hours; the greatest was 330 pounds. Our retorts are what are known as the Davison retorts. They are 30 inches wide at the back, and 14 x 26 inches in front. The average candle power for the whole time was 17.52. The percentage of coke used in the furnaces for the whole time was about 29 per cent. That is a little more than I reported last fall, but the benches have been used, some of them, for from 15 to 20 months, and we have to use a little more coke for that reason. I think the number of pounds of fuel used to carbonize 100 pounds of coal, as reported last fall, was 16.7 pounds; the average for the six months is 20.89. When running with the Westmoreland or Penn coal, and with the benches in good condition, we do not expect to get less than 5 feet to the pound; and the amount of fuel will not overrun what I stated last fall, when everything is in good condition.

Mr. Harbison—Are you putting in Dieterich furnaces in your new station?

Mr. Slater—We have two stacks of ten benches each; and we have rebuilt one of them with Dieterich furnaces. We shall rebuild the other the coming season, and shall put in Dieterich furnaces, unless we can find something better in the meantime.

Mr. Forstall—What is your yield per pound?

Mr. Slater—The average for the six months was 4.74; the highest was 5.21. We used 439,000 pounds of cannel, out of 20,480,931 pounds in all.

Mr. Forstall—Did you have any trouble with stopped standpipes?

Mr. Slater—I do not think we have any more trouble in that respect than we did previously, in the old way of running.

Mr. Starr—Have you had any naphthaline trouble?

Mr. Slater—We have been troubled somewhat with naphthaline, but I do not know that we are troubled any more now than we were before. We are troubled somewhat with the street lights, and somewhat with the services. The trouble with the street lights is that they have put on a new form of stopcock, having about one-eighth of an inch opening, and the naphthaline has accumulated there.

Mr. Starr—How do you get rid of the naphthaline?

Mr. Slater—By using a little alcohol.

Mr. Harbison—I would like to ask Mr. Slater how his labor account for carbonizing by the use of the Dieterich furnaces compares with that of the ordinary furnace; and whether there is any saving in labor per thousand feet.

Mr. Slater—I think there is a saving in labor. One man will tend twice as many furnaces as he could in the old way. Of course there is more coal to handle. Taking the entire cost of carbonizing, as compared with the old system, although I cannot exactly state the figures, I am satisfied that it is somewhat less.

Mr. Coombs—What is the size of the standpipes?

Mr. Slater—Six inches.

Mr. Coombs—How far is the standpipe from the front wall?

Mr. Slater—Not more than two inches.

Mr. Coombs—You say that you have no more trouble now in running 10,000 feet per retort than you had before?

Mr. Slater—No more trouble.

The President—We have for this afternoon but one other paper to be read, and that is by Mr. Edgerton, on the subject of heating by gas. He is not now prepared to proceed. In the meantime I would suggest for consideration another subject, which appears to me to be of very much more importance than is generally given to it by members of the Association. I refer to the more perfect utilization of residual products. A gentleman who is probably more familiar with that subject than any other member of the Association has recently been abroad, and has no doubt acquired additional information; and I know it will be both pleasurable and profitable to hear from Mr. Page. [Applause.]

Mr. Page—I thought, Mr President, that, in view of the time I had occupied with this subject at a previous meeting of the Association, I might possibly be excused from saying anything on this occasion, and I thank you for the honor you do me in calling me to my feet, and for the applause with which a reference to residual products has been received. I think it indicates that you are not, as yet, receiving all that you think they ought to yield. It also indicates that you are informed of the fact that residuals are really a matter of large importance to gas companies across the water. I know of hardly a company, of the many I visited, that does not publish every year large and increasing amounts received for coal tar and ammoniacal liquor. I question whether there are a dozen gentlemen present who can report any advance in the past year in the amount received by them for either of those residuals; and I suppose there are few present who received anything from the sale of ammoniacal liquor. From the diligent inquiries which I have made I have not been able to learn of a gas company in England, Ireland, or on the Continent, carbonizing even 500 tons of coal, which does not receive something for ammoniacal liquor; and all of them obtain not less than 35 cents per ton of coal carbonized. When I tell you that the company in the United States which receives the largest sum only gets 27½ cents per ton of coal carbonized, and that in Leeds Mr. Woodall, one of the most prominent gas engineers in England, reports his receipts at 75 cents per ton of coal carbonized, you can understand that there is something further to be made in the United States and placed to the credit of the works in the manufacture of gas. There is no reason why it should not produce nearly as much here as it does in Europe. The results last month at one of the gas works in the vicinity of New York city seem to indicate that American coal produces as much ammonia as English coal, as a product of 32⅔ gallons of 10½-ounce liquor per ton of coal carbonized was obtained. I have remarked only two or three reports of greater yield than that by any English company, and they were gained by the use of special coal. An additional reason why ammoniacal liquor should be worth nearly as much on this side of the water is the fact that every pound of the sulphate of ammonia made here is marketed at prices equal to those which are being paid in England or Germany; and the demand is steadily increasing, being largely governed by the remarkable number and extent of fertilizer manufactories. Gentlemen from Louisville, Baltimore, Chicago, New York, and Boston will bear me out in the statement that that branch of industry is growing faster, perhaps, than any other in the United States. The cotton, tobacco, and sugar fields of the South are demanding more fertilizers, and in order to produce the desired results they must contain a large percentage of ammonia. The farmers of New England and the Middle States are also using fertilizers to a larger extent and with greater wisdom than ever before. In fact, I know of farmers who do not rely altogether upon the honesty of the fertilizer manufacturers, but buy the sulphate of ammonia and put it in their own home-made fertilizers. The new industry which is soon to be set in operation here—the production of soda by the ammonia process—adds another reason for the statement that there must be an increasing demand, at a steady price, for sulphate of ammonia and ammoniacal liquor as well. It is known to many of you

that sulphate of ammonia can be easily produced upon the premises of any gas company which carbonizes a fair amount of coal. It is already being done, I think, by three or four gas managers who are members of the Association; and the results obtained by them are very successful and satisfactory. Across the water it is done to a much larger extent. With respect to the utilization of coal tar, I will say that the discoveries of the past year have not, perhaps, been exceeded by those of any preceding year. Its value is increasing, and the prices paid are higher, although, as some of you may have remarked, there has been a falling off in the price of anthracene, induced partly by the greater production, and also by a less demand at the present time, temporarily, in certain parts of the world for the colors produced from anthracene. But the difference has been more than made up by the advance in the price of benzole; that is selling in London at the present time for $2.50 per gallon. When you consider the price you are obtaining for coal tar, and remember that about half a gallon of benzole is obtained from a barrel of coal tar, you can at once estimate what you are losing, and can put upon the coal tar a better estimate of its true value. I think it is a fair statement to say that not a tenth part of the coal tar produced in the United States is used in such a way as to enable the gas company to receive any value for the benzole. I think that about 20 per cent. of the coal tar is used for the purpose of saturating felt paper for roofing purposes. The benzole is evaporated in heating the tar. A large proportion of coal tar is used in making concrete walks; and the benzole is all lost. Most of those who distil coal tar make only crude naphtha, creosote oil, and pitch; and the most valuable products are lost. It is not so in Europe. There all the valuable fine products are utilized in their treatment of the tar. Hence a higher price is paid for it to the gas companies. Next in importance after the benzole is the creosote oil. The price of that to-day is higher in our country than it has been since it was first produced. There is a great demand for it; in fact, thousands of barrels of creosote oil are being imported into the United States from England, paying a heavy duty. It is being used for the treatment of timber and ties by three or four of our great railroad companies. The cost to them is about 10 cents per gallon. As from a barrel of coal tar 12 gallons of creosote oil are obtained, you should derive from that product alone $1.20. Taking also the chief product of the tar—pitch—which is used so extensively for roofing and paving, we find that it now commands a higher price here than ever before. It is selling at from 8 to 10 cents per gallon. The yield from a barrel of tar is 24 or 25 gallons, which, at 8 cents per gallon, gives you $2. I have not referred to the many other products, among them carbolic acid and naphthaline, the latter of which is increasing in value because of its being used to quite a large extent in color making and in the albo-carbon light. You will be interested to know that the most beautifully illuminated building I visited while in Europe was the Westminster Aquarium, which was lighted with the albo-carbon light. It is merely the placing, in a small metal globe, sections of naphthaline in the shape of a candle. The heat of the gas burner causes the vapor of the naphthaline to be generated. It is burned in contact with the gas, and gives a magnificent light. It is a light which is gradually increasing in use; so that naphthaline has a steady demand for that purpose alone. As to the proper mode of using the coal tar here, it may be of interest to know that in some of the largest cities the gas companies are divided up by the distillers of coal tar. There is no competition, and hence a comparatively small price is obtained. In order to produce the fine products in an economical manner, it is essential to have a large quantity of coal tar; and therefore the suggestion which I have made on two or three occasions is certainly worthy of consideration, if the best results are to be realized by the gas companies for these two residuals of increasing value, there should be co-operation, and they should be sent to a common center, where there could be the advantage of a single organization and the employment of skilled chemists. The coal tar and concentrated ammoniacal liquor can be transported in tank cars as far as 150 miles, at less cost than would be incurred for carting two miles. I think this is a matter worthy of very serious thought by the gentlemen of the Gas Light Association. It has been carefully considered by individual members, and thus far I have not been advised of any marked objection to the plan. If time allows, I should be glad to answer any questions concerning this subject, and hear expressions of opinion by members of the Association.

The President—Personally, I regard this as the most important subject that can be brought to the attention of our members I trust, therefore, that those who desire further information will be very liberal in their inquiries.

Mr. Somerville—I would like to ask Mr. Page if he can give us an estimate of the cost of erecting factories for ammoniacal liquor, say for a gas works carbonizing 1,000 tons of coal per year.

Mr. Page—It would hardly be profitable to erect a separate sulphate works for a company carbonizing so small a quantity as 1,000 tons per year; but across the water works are being operated by companies carbonizing from 2,000 tons upward. I might add, upon this matter of manufacturing the sulphate of ammonia, that there would be an advantage in aggregating the ammoniacal liquor at a common point and working it, because the greater quantity of liquor would then admit of the manufacture of sulphuric acid on the spot, saving thereby transportation and also the profit which is made in manufacturing sulphuric acid, and eventually producing sulphuric acid from the sulphur of the spent oxide of iron which is now so extensively used, and which in England produces a large percentage of the sulphate of ammonia. The oxide of iron is burned in a furnace, the fumes of sulphur being given off and passed into a chamber, producing a quantity of acid which is amply sufficient for making sulphate of ammonia. I visited two or three works which were operating in that business on a large scale. I saw this morning, at the works of the Allegheny Gas Company, spent oxide dumped over filling which contained, unquestionably, from 50 to 60 per cent. of sulphur. There seems to be a growing tendency among gas people to use the oxide of iron to a greater extent; abroad it is almost universally used. I did not visit a single gas works where all the apparatus of the purifying house was occupied with lime. Therefore, by this combination, there will be three residuals to be utilized: the tar, the ammoniacal liquor, and the sulphur.

The President—I believe that Mr. Price, of Cleveland, has had some experience in the utilization of residual products. Does he desire to say anything upon the subject?

Mr. Price—I had no intention of saying anything upon the subject. We have done nothing but sell our ammoniacal liquor; we have not worked it ourselves. We have some plans with regard to it in the future, but have accomplished nothing as yet.

The President—What income do you derive from the sale?

Mr. Price—We receive for the ammoniacal liquor 10 cents per ton of coal carbonized. I have an offer of 25 cents per ton from a party in the East, but have not yet closed with anybody. I want to get more. I want to go slow, that I may be sure. It seems to me that we ought to get 40 cents per ton of coal carbonized.

Mr. Page—It will depend upon the strength of the liquor. What is the strength of your liquor?

Mr. Price—The strength of the liquor we produce is about 10 ounces. Our arrangements for extracting the ammonia with which the gas is charged when it leaves the retort are not or may not be the best. We have two cylindrical scrubbers, perhaps 3 feet in diameter and 30 feet long. These stand on end near together in the scrubber room, and are filled with brush. Above one of these scrubbers there stands a tank having 100 barrels capacity. Above the other a much smaller tank is placed. The ammoniacal liquor produced in carbonizing runs from the hydraulic main into the tar well, and from that slowly drips into scrubber No. 1, keeping the brush wet, and taking from the gas, as it rises through the scrubber, the ammonia with which it is charged when it leaves the retort. From the base of the scrubber the liquor runs to an underground tank, where it settles and overflows into another, where it again settles, and from which the liquor, thus purified, is pumped to the sulphate works. The gas, after leaving the first scrubber, passes to the care of scrubber No. 2, and runs through the brush in it, which is kept wet with pure water, which is constantly dripping upon it from the small elevated tank mentioned above. This stream of pure water takes from the gas nearly all the ammonia which remains after passing scrubber No. 1, and runs into the tar well and mingles with the stronger liquor there, and with it is pumped up into the large elevated tank, from which the combined liquor descends as I have described. We have been selling our ammoniacal liquor at a very low price. We have not been satisfied with the price, and have been for some time corresponding with parties with a view to finding some better way of disposing of it. I have been much interested in reading in the London *Journal of Gas Lighting* the proceedings of the last meeting of the Gas Institute, at which several interesting papers were read upon the different styles of apparatus for manufacturing the sulphate. Mr. Page informs me that he controls a very valuable process for manufacturing the sulphate. I think our friend from New Orleans, the President-elect, could give us some information with regard to the manufacture of the sulphate at his works, where the result has been very satisfactory, judging from what he wrote me last winter. I think we cannot overestimate the importance of getting the full value of our residuals. It is a constant reproach to us that we are receiving for gas much more than it is sold for abroad. I suppose that those who reproach us do no reflect that we labor under the disadvantage of getting but little for our residuals with the exception of coke; that the tar is often sold for as little as $1 per barrel; and that the ammonia has generally been thrown away. If we can only get what our foreign friends receive for their residuals, we can sell gas nearly as cheap as they. Of course, the plant and the labor costs more here than it does abroad. We ought to encourage every judicious step taken to get all that there is in the ammonia and all that there is in the tar which we produce at our works. I should like to hear from Mr. Forstall as to his experience.

Mr. Forstall—I have not much to add to what Mr. Page has already said. We are not doing as well as they are doing on the other side, but we have for the last five years been utilizing the ammoniacal liquor in New Orleans. We

commenced to do so under very great difficulties, because we had to make our own sulphuric acid; and the quantity of liquor which we had to handle was hardly sufficient to warrant us in the erection of a separate chamber. We did so, however. We imported sulphur from Sicily. The result of four years' experience has been that this past year the ammoniacal liquor has netted a profit of a little over 40 cents per ton of coal carbonized; and we have made, as our share of that, about 27½ cents, the gentleman who is running the works, under a sort of partnership arrangement with us, has made the balance. We have made arrangements for the next year by which our profits will be a little larger. This is with the use of about 2,300 tons of coal. The sulphuric acid costs us within a fraction of one cent per pound. The first year we attempted to buy it we were charged over two cents per pound. Our sulphate has been sold as low as four cents per pound. About two-thirds of our production is aqua-ammonia. If we were confined to the sulphate of ammonia we would not make so much profit. There is more profit for us in the making of aqua-ammonia for the use of ice works. We make two grades—one from the crude liquor, and one a little purer, from the saturated solution of ammonia, for which we get 9 cents per pound. The strength is 26° Beaumé. The demand for aqua-ammonia is rapidly increasing in the South. We expect next year to make no sulphate at all, but will be able to dispose of all our ammoniacal liquor in the form of aqua-ammonia; and the profits will correspondingly increase. The plant, including the acid chamber and apparatus for making both grades of the aqua-ammonia and sulphate, has cost a little less than $10,000. The wear and tear and depreciation will average about 5 per cent. per year, or about $500. Against this apparatus we charge this 5 per cent. of depreciation and 7 per cent. interest upon the cost of construction; and the figures I have given you—40 cents per ton—are net, after allowing for all repairs, depreciation, and interest upon the cost of the works.

The President—How much would be your gross income per year, inclusive of those expenses?

Mr. Forstall—It would add 6 cents per ton more, or 46 cents per ton of coal carbonized.

The President—That, I suppose, is the basis upon which statements have been made as to the amount of receipts abroad—that is, the gross amount received.

Mr. Forstall—There are many companies abroad which work up their own residuals, but the majority sell them. The difficulty with us in selling is that we cannot make a strong liquor. The climate is so warm, and the water used for washing is so warm, that our average strength of liquor is only about 6 ounces; and we could not find a contractor willing to buy that and take the risk of making money out of it. We were therefore compelled to work it up ourselves. We find that even the weak liquor has a great deal of ammonia in it. We are not able to get all the ammonia from the gas in a shape available for working. We take it all out of the gas, but the liquor which comes from our last scrubber is so weak that it is cheaper to let it go to waste than to mix it with the stronger liquor, and still further reduce the average. We ought to get about 25 pounds of the sulphate to a ton of coal.

The President—If there are no other inquiries to be made with regard to residual products, we will proceed to the reading of the next paper, entitled "Heating by Gas," by Mr. H. H. Edgerton.

Mr. Edgerton's paper was then read, as follows:

HEATING BY GAS.

The superiority of gaseous fuel for the many purposes to which it is now applied lies in the fact that gas heat can be used with far less waste than solid fuel. Hence it should be the constant endeavor of those interested in extending the use of gas as a fuel to seek first to supplant solid fuel in those fields where, from the necessities of the case, the use of solid fuel is most inconvenient and wasteful.

There appears to be a notable difference of opinion among gas managers as to the proper limits of the usefulness and economy of gas as a fuel; some claiming gas to be economical for uses for which to others it appears impracticable and absurd. So great is this divergence, that while some would not hesitate to recommend it for thawing snow out of the street in winter, others would hardly advise the use of gas to heat a cup of water for shaving purposes.

It is my purpose in this paper to point out a plan by which, for certain employments of gas, doubt and differences can be set at rest. The plan and apparatus to carry it out was gotten up originally to ascertain the relative amount of radiant heat from luminous and non-luminous flames; but I find that the method can be satisfactorily used to compare the heat of different gases, or even solid fuel, under conditions exactly similar to those we find in practice.

For the purpose of measuring the quantity of heat, the unit employed is the amount of heat necessary to raise 1 pound of water 1° F. This is considered a very uniform and exact standard. To apply this measure conveniently to the measurement of heat of gas flames, I constructed the following apparatus: In fig. 1, A represents a plain cylinder of wrought iron, 4 inches in diameter and 12 inches long, capped at each end. It is tapped at one end for ⅜-inch pipe, as well as at the bottom of the opposite end. The lower opening forms an inlet for water, and the upper opening an outlet. In both

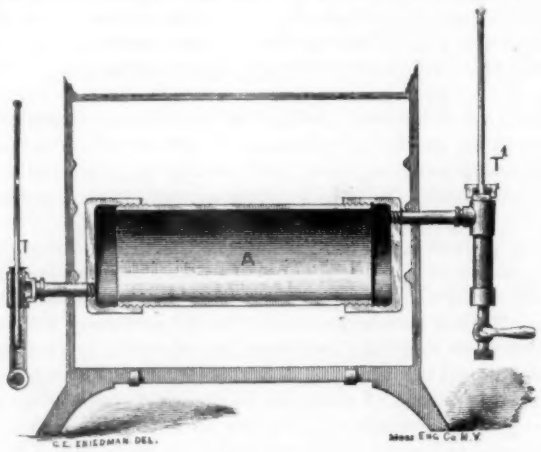

Fig. 1.

inlet and outlet, as shown in the drawings (figs. 1 and 2), are cemented very accurate thermometers, T T'. The inlet is connected to a source of water supply of fairly uniform temperature. The outlet is led into a receiver, which can readily be transferred to a scale pan and weighed at intervals.

As before stated, my first experiments with this apparatus were devoted to ascertaining the relative heating capacity of luminous and non-luminous flames. The cylinder in question was inserted in a box or oven lined with bright tin, the surface of the cylinder having been previously blackened. Water was turned on to a suitable degree, and the temperature of the inlet water noted. The burner to be tested was then lighted, the state of the water having been previously noted, as well as the time of lighting.

The following is a test of radiant heat from a luminous flame. The flames were the usual rat-tail jets such as are seen in the ovens of gas cooking stoves.

Manhattan Gas. New York, May 18, 1882.

Gas Consumed. Cubic Feet.	Time.	Heat Units.	Total Heat Units from start.
1.....	2 m. 50 s.	33.3 per c. ft.....	——
2	6 m. 12 s.	50.9 "	84.2
3.....	9 m. 51 s.	75.6 "	159.8
4.....	13 m. 30 s.	88.3 "	248.1
5	17 m. 10 s.	94.5 "	342.6
6.....	20 m. 47 s.	95.8 "	438.5
8.....	28 m. 2 s.	205.4 "	643.9
9.....	31 m. 38 s.	102.3 "	746.2
10.....	35 m. 8 s.	99.9 "	846.1

Fig. 2.

In round numbers, it required a consumption of 6 cubic feet before the oven attained its maximum of heat, and from that time on an average of 100 heat units per cubic foot of gas were absorbed by the cylinder.

A trial made with a non-luminous flame coming from large apertures in gas pipes, such as are usually seen in gas stoves, developed the following results. The burner was adjusted to show white tips to the flame.

Gas Consumed. Cubic Feet.	Time.	Heat Units.	Total Heat Units from start.
1	3 m. 15 s.	13.8 per c. ft.	—
2	6 m. 30 s.	36.3 "	56.1
3	9 m. 57 s.	54.4 "	110.5
4	13 m. 25 s.	71.1 "	181.6
5	16 m. 15 s.	78.5 "	260.1
6	20 m. 40 s.	106.2 "	366.4
7	24 m. 50 s.	122.6 "	488.9
8	29 m. 2 s.	129.8 "	618.7

A trial made of a non-luminous flame, issuing from a perforated plate, and evenly distributed in a flat flame—the American Meter Company's gas oven burner—developed as follows :

Gas Consumed Cubic Feet.	Time.	Heat Units.	Total Heat Units from start.
1	4 m. 32 s.	17.8 per c. ft.	—
2	9 m. 0 s.	52.4 "	70.2
3	13 m. 33 s.	88.9 "	159.1
4	18 m. 8 s.	113.2 "	272.4
5	22 m. 38 s.	123.0 "	395.4
6	27 m. 10 s.	141.4 "	536.8
7	31 m. 45 s.	180.0 "	716.8
8	37 m. 16 s.	175.3 "	892.0
9	40 m. 46 s.	174.8 "	1066.0
10	44 m. 10 s.	173.4 "	1240.2
11	49 m. 32 s.	178.4 "	1418.6
12	53 m. 52 s.	175.8 "	1594.4

The sheet flame, non-luminous, therefore gives out, when under full headway, nearly 75 per cent. more radiant heat than the luminous flame. This demonstration utterly reverses the commonly accepted opinion. But there is generally some foundation for even the crudest of opinions, as is shown in this case ; for, on examining the test of the luminous compound with the non-luminous jet flame, it is seen that the luminous flame develops its heat a trifle more rapidly from first lighting, and hence might feel hotter to the hand exposed but a moment to the heat. But the flat flame non-luminous burner appears to develop radiant heat both more quickly and in greater quantity than the luminous.

The total quantity of heat in Manhattan gas may fairly be taken at 800 heat units per cubic foot of gas. Hence 22 per cent. of the total amount is absorbed as radiant heat by a cylinder only one-third the width of the oven. The apparatus devised by Hartley for ascertaining radiant heat of burners absorbed but 7 to 9 per cent. of the total, and hence would give less reliable data than when the absorption is more complete. A test of Fletcher's solid flame burners in one of his instantaneous heaters demonstrated quite a large percentage of heat absorbed by this form of water heater—from 505 to 540 heat units per cubic foot of gas being absorbed, or 63 to 67 per cent. of the total. Maughan's geyser gave 286 to 302 heat units, or 36 to 37 per cent.

As before stated, the apparatus can be well used to give a practical demonstration of the value of different gases for heating and cooking purposes. My main object in this paper is to suggest some sort of guide or measure, so that in developing uses for heating gas the most economical lines may be followed, and that we may neither expect too little nor too much from the various forms of cooking and heating apparatus, but be able to measure the results from all by one uniform scale, and thereby avoid those differences and uncertainties of opinion which appear to impede progress.

The President—Mr. Edgerton will be glad to answer any questions that you may propound to him. I understand that Mr. Goodwin has made some experiments with regard to the heating capacity of gas. We shall be glad to hear from him.

Mr. Goodwin—I have not the figures bearing upon the subject of the heating capacity of luminous and non-luminous flames with me. I made such tests, and read them before the Association two or three years ago ; and I would not like to speak from memory upon that subject. I have, however, some figures regarding the calorific power of gas, which I will, when this question is through being discussed, be glad to give to the Association if it desires to hear them.

The President—I think it will be the pleasure of the Association to hear you now, as the subject is one nearly related to that treated in Mr. Edgerton's paper.

Mr. Goodwin—They are not exactly of the same nature. What I have are the results in figures hastily compiled from experiments made by Mr. Hartley and other gentlemen, giving the calorific power of gas, and which of necessity depends upon its composition. Dr. Frankland, in an analysis of the London gas, found it to be composed of the following constituents :

Hydrogen	48.70 per cent.
Marsh gas	38.20 "
Condensible hydrocarbon	3.45 "
Carbonic oxide	7.92 "
Carbonic acid	.31 "
Nitrogen	1.00 "
Oxygen	.42 "
	100.00

Dr. Letheby, from various trustworthy sources, compiled a table of the calorific power of gas, leaving out the nitrogen, oxygen, and carbonic acid above enumerated, as absorbers or obstructers of heat ; and he found that the combustible gases—namely, hydrogen, marsh gas, carbonic oxide, and the illuminating gases—gave the following results :

One cu. ft. of hydrogen gas will elevate 1° F. 329 lbs. of water.
" " marsh gas " " 996 " "
" " olefiant gas " " 1585 " "
" " carb. oxide gas " " 320 " "
" " common coal gas " " 650 " "
" " cannel coal gas " " 760 " "

Or one pound of each of the following gases will elevate water 1° F.:

One pound of hydrogen gas will elevate 1° F. 62,000 lbs. water.
" " marsh gas " " 22,513 " "
" " olefiant gas " " 21,344 " "
" " carb. oxide gas " " 4,325 " "
" " common coal gas " " 21,060 " "
" " cannel coal gas " " 20,140 " "

If we multiply the percentages of the combustible gases by the appropriate numbers, there is obtained in the result the calorific power due to 100 cubic feet of gas, as follows :

	Percentage.		Pounds Water.		Heat Units.
Hydrogen	48.70	×	329	=	16,022.3
Marsh gas	38.20	×	996	=	38,047.2
Olefiant gas	6.90	×	1585	=	10,936.5
Carbonic oxide gas	7.92	×	320	=	2,534.4
Actual volume or weight of the several combustible gases					67,540.4

—or, in round numbers, 680 heat units in one cubic foot of gas thus composed. Some gentlemen estimate it at 700 ; Mr. Edgerton has just stated the Manhattan gas as 800. By calculation derived from multiplying the weight of each constituent gas by its gravity and by the weight of a cubic foot of air, it is found that 100 cubic feet of gas weigh 3.796 pounds, or 32 cubic feet of gas weigh 1 pound. One cubic foot of gas weighs 218.9 grains, .4085 specific gravity ; one cubic foot of air weighs 535.9 grains. If we multiply the weight of 32 cubic feet (1 pound) by the calorific power as determined by Dr. Frankland—namely, 680 heat units—we have 21,780 heat units derived from 32 cubic feet of the combustible gases, or a total of 68,000 heat units from 100 cubic feet of gas, as already stated. In practice, however, as Mr. Edgerton has just stated, this is not realized ; we fail to realize this amount by at least 200 heat units. In fact, we might say we scarcely realize 500 heat units. If this data is correct, it will be quite easy for you to calculate the relative calorific power of the different gases manufactured under the various processes in vogue as presented to you for your consideration. If we take one ton of coal and convert it into gas, and then compare the calorific power of the combustible gases with that of the coal used under a boiler for engine purposes, we will be able to solve the problem of the comparative values of coal used in its natural state and in its gaseous form for motive power, for heating, or for cooking purposes. By way of comparison, I may state that the best compound condensing engines use about two pounds of coal per hour for generating one horse power. The ordinary engines use about five, and the small engines all the way from four to ten pounds per hour. It should be remembered that when work is interrupted at night and at meal times, a considerable quantity of fuel is used in generating and maintaining steam. The economical results may be summed up as follows : Engines using the quantities of coal enumerated below convert into work the following percentages of the total heat of combustion :

2 lbs. coal per HP. develops only 9 per cent. of the total heat of combustion.
3 " " " " 6 " " " "
4 " " " " 4.5 " " " "
5 " " " " 3.6 " " " "
6 " " " " 3 " " " "
7 " " " " 2.6 " " " "
8 " " " " 2.3 " " " "
9 " " " " 2 " " " "
10 " " " " 1.8 " " " "

According to calculations, carefully made, it has been found that if all the

heat of combustion were converted into power, steam engines would require but .18, or say one-sixth, of a pound of coal to produce one horse power, instead of the amounts just named. It needs but little calculation to arrive at the great loss of heat by the present mode of producing power. For instance, if the theoretical value of coal could be realized (viz., 2,240 lbs. of coal × ⅓ lb.) a ton of coal would equal 13,440 horse power. The best engines, as already stated, use two pounds of coal—viz., 2,240 lbs. of coal ÷ 2 lbs. = 1,120 horse power per ton of coal, and a great many engines use ten pounds of coal—viz., 2,240 lbs. coal ÷ 10 lbs. = 224 horse power per ton of coal. At this point I would like to say that in gas engines, if all the heat of combustion in one cubic foot of gas were converted into work, it would require but 3.66 cubic feet to produce one horse power. If the total amount of 12-candle power gas produced from a ton of coal (say 12,000 cubic feet) could be converted into power, we should realize 3,278 horse power—viz., 12,000 c. ft. ÷ 3.66=3,278 horse power per ton of coal converted into gas. If, however, we use 20 feet of gas per horse power, we have less horse power from a ton of coal in a gaseous form. If these figures are correct (and I believe them to be so), a careful study of them will help to dispel some of the notions entertained in regard to the expense of using gaseous fuel as compared with coal, leaving entirely out of the question its advantages in the direction of no wood being required, and also dispensing with the ashes and the dirt.

The President—The paper read by Mr. Edgerton and the remarks made by Mr. Goodwin are certainly very interesting and instructive, and I am sure that either gentleman will be glad to answer any inquiries relative to the subject. If there are none, we will listen to the reading of a paper by Mr. Ramsdell, upon the subject of gas engines.

[To be continued.]

Protecting the Gas Consumer.

The following circular is distributed by the American District Telegraph Company at the houses of their customers—

New York, June —, 1882.

To the Public—

In a circular issued by this company, on June 1st, we made the announcement that we had established a Bureau of gas meter inspection, the object being to employ reliable men to take the registry of meters weekly, semi-monthly, or monthly, as may be required, and to furnish statements thereof to the consumers; and to test meters, when necessary, to ascertain if the same are recording the gas correctly, and to inform the applicants of the result.

Every consumer of gas should know whether his meter is recording correctly and his gas bills correspond with the true index of the meter.

Let us state the position at present between the gas companies and the consumer:

The gas company furnish gas, the consumer burns a certain quantity of it. The gas consumed is supposed to be registered on the dial plate of the meter. The meter may record correctly or it may not. The gas company may not know which is the case—the consumer never knows. The meter may have been in use for years without having been tested. The company sends in the bill, and the consumer has no means of knowing whether it is correct or not. If he thinks it is too high, he may, at the expense of time and trouble, complain to the gas company; but (as the situation is at present) it rests entirely with the company whether they give him any redress, as he has nothing in the way of evidence against the meter and the testimony of the man sent by the company to record the meter—one or both of which may be in error. What we propose to do in the interest of the consumer of gas is—

1st—Take the register of the meter weekly, semi-monthly or monthly as may be necessary, and leave a statement of the record at the house, so that it can be compared by the consumer with the bill of the gas company.

2d—To thoroughly investigate, where suspicion is held that the meter is not recording correctly, and to assist the consumer in having the meter officially inspected and tested by the State Inspector as to its reliability.

3d—To discover gas leaks, if such exist, which is frequently the case, unknown to the consumer, but are nevertheless recorded by the meter.

4th—To give such advice to the consumer as will tend to materially reduce his gas bill.

Finally—to keep a constant supervision over the interests of the consumers of gas (which has hitherto been greatly neglected), and to give them the benefit of the scientific knowledge and experience we possess, to the end that they may have better light, smaller bills, and the consolation of knowing that they are getting what they pay for, and are not paying for what they do not receive.

It is an indisputed fact that gas consumers, as a rule, are not satisfied (whether they have cause or not we do not pretend to say) that the men employed by the gas companies to "take the meters" monthly, are always accurate in their calculations.

The men whom we employ in the responsible position of gas inspectors will be uniformed and thoroughly equipped, and every precaution will be taken to insure perfect accuracy in taking the index of meters.

The price hereafter will be fifty cents per month, instead of seventy-five, as heretofore. Those wishing to avail themselves of the services of this company are requested to send in their application as soon as convenient, as a number of meters will require testing during the summer, and the consumers will probably be desirous of knowing as soon as possible whether their meters are recording correctly. The price of testing meters will vary according to size and location.

All applications for inspection and testing of meters should be sent to the American District Telegraph Co., No. 8 Dey Street, New York City.

☞ In making your application, please inform us the date of your last gas bill.

[*Form of Application.*]

In consideration of being furnished by the American District Telegraph Company with a statement, fortnighly or monthly as may be necessary, of the registry of the gas meter on———, premises No.———, agree to pay to the said American District Telegraph Company the sum of fifty cents per month for at least six months and until notification of discontinuance of said service shall have been given by ——— in writing to its Executive Office, No. 8 Dey Street.

Witness: ——— ———

Dated New York, ——— , 188——.

The circular further contains a letter from the State Inspector of gas meters of this State, and an extract from another letter from the Inspector of gas and meters at Washington, D. C.; but the main point wanting in the circular is an extract from the State law bearing on the subject, which may be found in Chapter 311, sections IV. and V., 1859, and which are as follows—

IV. It shall not be lawful for any corporation, company or person, at any time after this act shall take effect, to furnish and put in use any gas meter which shall not have been inspected, proved and sealed by said inspector, except during such time as said office of inspector shall be vacant, or said inspector, after request made, shall refuse or neglect to prove and seal the meters furnished for that purpose, and except the meters in use when this act takes effect, and which may be removed for examination or repairs.

V. That every such gas light company shall provide and keep in and upon their premises a suitable and proper apparatus, to be approved and sealed by said inspector of meters, for testing and proving the accuracy of the gas meters furnished for use by said company, and by which apparatus every meter may and shall be tested, on the written request of the consumer, to whom the same shall be furnished, and in his presence if he desire it. If any such meter, on being so tested, shall be found defective or incorrect to the prejudice or injury of the consumer, the necessary removal, inspection, correction and replacing of such meter shall be without expense to the consumer; but in all other cases he shall pay the reasonable expenses of such removal, inspection and replacing; and in case any consumer shall not be satisfied with such inspection of the meter furnished him, and shall give the company written notice to that effect, he may have such meter reinspected by the state inspector (if he require it) upon the same terms and conditions as above provided for the original inspection thereof.

From which it would appear that any person can do by himself, by simply writing a letter, if he does not wish to take the trouble to visit the gas company's office, all that it is proposed to do "for fifty cents a month."

Doubtless many people will prefer to pay fifty cents a month for some one else to attend to their affairs rather than be bothered by minding their own business. But when all is done, and a question arises as between the gas consumer and a gas company, the provisions of the law above given must be complied with in the end. There is no doubt but that every gas company in the land would be most highly delighted if all its consumers could be made perfectly satisfied; and if the interposition of men employed by the District Telegraph Company, who are "uniformed and thoroughly equipped," will satisfy every consumer that his bill is as nearly correct as the general run of "bills" of all descriptions usually are, and that his meter is no more liable to error than the scales of his grocer or his butcher, and that if there is an error there is also a regular and easy way of having it corrected—why, then, the District Telegraph Company will not have been chartered in vain, and peace and comfort will reign supreme around the head of the "man at the helm" in the gas company's office.

New Safety Lamp.

The *Journal of the Society of Arts* contains the following description of a safety lamp, the invention of M. Lechein—

M. Tricot, manager of the Mons gas works, lately brought before the Association des Gaziers Belges a new fixed lamp, invented by M. Lechein, for burning safely while surrounded by an explosive mixture of air and gas, such

as may be present in gas works or petroleum stores; and also for maintaining combustion in an atmosphere charged with smoke and carbonic acid, as in the passages of a burning theater.

A metal bracket, with orifice in connection with a pipe leading a supply of pure air from a safe distance, is securely fixed to the wall, and is provided with a groove, filled with sand, for receiving a projecting collar at the bottom of the lamp, so as to form an air-tight joint. In the bottom of the lamp is a valve, opening inwards, which keeps it closed until placed in position, when it opens automatically. The cover, made separate for facility of cleaning, is also provided with a sand joint, and the trunco-conical chimney is of such dimensions that no air or gas can enter the lamp by its means; while a sheet of perforated metal or wire gauze, placed across it, affords an additional safeguard. When the source of light is vegetable or mineral oil, the lamp has simply to be lighted, in a pure atmosphere, before being placed in position, as it contains sufficient air to support combustion for two or three minutes, when the air-valve opens.

When lighting gas is used, the simplest method is to light a small piece of taper near the burner before fixing the lamp and making the connection with the gas supply pipe; or the gas may be lighted by electricity, or by a fulminating capsule.

The Equitable Gas Light Company of New York City.

Judge Arnoux, in the Superior Court, Chambers, on Tuesday, December 26th, denied the application for a permanent injunction in the suit brought by Mr. Michael Noonan against the Mayor, the Comptroller, and Commissioner of Public Works, to restrain the defendants as a Gas Commission from granting permission to the Equitable Gas Light Company to tear up the streets and place mains underground.

On the same date Mayor Grace vetoed the resolution of the Aldermen rescinding the old ordinance permitting the Gas Commission to grant franchises to lay mains through the streets. On the afternoon of same date the gas commission, which is composed of the same officials whom Noonan sought to permanently enjoin, met and considered the application of the newly organized Equitable Gas Light Company for privileges enjoyed by the existing companies. It was decided to grant a franchise to the Equitable Company under certain stipulations.

The company agrees to furnish gas to the public at $1.75 per 1,000 cubic feet and to pay the city 20 cents for each lineal foot of mains laid. The street lamps are to be lighted for $12 each a year.

An English Gas Exhauster.

A late Number of *Engineering* gives an illustration of a vertical engine and gas exhauster constructed by Messrs. W. H. Allen & Co., of York street Works, Lambeth, to the order of Mr. Robert Morton, of the London Gas Light Company, for the works of that company at Nine Elms, London.

The exhauster is constructed on the principle known as Beale's patent, but greatly improved and modified by Messrs. W. H. Allen & Co., who employ steel for all the working parts as far as possible, increasing all the internal surfaces and making all the revolving parts lighter, thus reducing the pressure per square inch on the bearings and decreasing the friction. This exhauster has been made with unusually strong proportions, as it has been designed for working against a pressure of 50 inches of water, the engine being of proportional power. This pressure would but a short time since have been thought very extravagant, but the daily increasing necessities of our large gas works compels its being employed.

The engine has an inverted cylinder 16 inches in diameter by 14 inches stroke, supported on a strong standard, while it is firmly tied to the front of the baseplate by a steel bar. The pressure of steam used is 40 pounds on the square inch and cut off at a quarter stroke. The whole of the working parts, including crankshaft, are of steel, and the lubricators are so arranged as to allow of the engine working continuously.

These exhausters, when working in connection with the new vacuum governor made by Messrs. Allen & Co., show a remarkably steady gauge. We have seen diagrams taken from one of them indicating a 24 hours record, in which the variation did not exceed one-eighth inch beyond the usual oscillation of the exhauster.

Correspondence

[The Journal is not responsible for the opinions expressed by correspondents.]

Experience with Patent Processes at Norfolk, Va.

Engineer's Office, City Gas Light Company,
Norfolk, Va., Dec. 20, 1882.

To the Editor American Gas Light Journal:

In your published report of the proceedings of the American Gas Light Association there appears a statement, made by Mr. Helme (on page 275 of the Journal of Dec. 16), relating to affairs at Norfolk, which is inconsistent with the facts, and which would do great injustice to the management of this company—past and present—if allowed to go uncontradicted. For the benefit of your readers who would wish to know the truth, and in justice to all the parties concerned, more especially Mr. P. W. Mackenzie, and Mr. C. S. Allmand, the President of this company, it is to be hoped that you will give this communication space in your columns.

Mr. Helme's statement is, in the first place, an unjust and undeserved criticism on the management of Mr. Allmand, who is at present too sick to answer for himself; but I will add that I feel confident that Mr. Helme spoke what he believed to be so, and, therefore, no blame can be attached to him. And now for the facts.

The Mackenzie process *was* tried at Norfolk about seven years ago at the expense of Mr. Mackenzie and his partners. This company did not lose one cent in the matter. All the losses were borne by Mr. Mackenzie and his partners. The process failed, not through any fault of Mr. Mackenzie, but because he met with obstacles, on the nature of which I will not enlarge at present, but which Mr. Mackenzie himself will very likely be perfectly willing to communicate to such as may inquire of him. As I was not connected with this company at that time, I will give my authorities for the statement made—they are Mr. C. S. Allmand, President of this company, Mr. Sayre, a former partner of Mr. Mackenzie, and, in part, the latter gentleman himself. Now, as to the Lowe process and the Allen-Harris process. This company bought the Allen-Harris before buying the Lowe. What the Lowe cost this company is very likely known only to the parties concerned. Both sets of works, the Lowe and Allen and Harris, were built about the same time under my supervision. The sickness of our President did not delay the work at all, as has been stated elsewhere in the Journal. The delay in completing the Allen-Harris process here was caused by the owners of the patents or their agents. We were ready and willing to proceed, and urged haste to the Allen-Harris parties more than once. However, the Lowe apparatus was ready nearly two months before the other. The results, in quality and cost of the gas were entirely satisfactory to the directors of this company, and we stopped the Lowe process to try the Allen-Harris, in which this company had a larger interest, and did not throw the Lowe overboard at all. The results were far better than we were led to expect by the contractors who furnished the Lowe apparatus; and I may say that our directors are fully satisfied that they made a profitable investment in purchasing this apparatus. We had our drawbacks with it, too, at first; but had overcome them when we stopped for the purpose previously stated.

Now, as to the Allen-Harris process. We tried that for a few days only, and that trial was not sufficient to establish or to condemn the process with us. We had only one set of this apparatus, and our consumption increased so rapidly, just at that season of the year, that the Allen-Harris set could not supply the demand; and, furthermore, as we had fired our coal benches as a precautionary measure when began this trial, and *after* we had let down our Lowe set, and as we had a large stock of coal on hand, we decided to continue making gas that way for the Winter.

The Allen-Harris gas made a little trouble for us; but, as above stated, the trial was of too brief a nature to condemn or establish the process here. We were fully satisfied as to the cost of the gas before going into it. We were making coal gas (in the holder) at two cents per 1000 cubic feet *less* than Mr. Allen's own figures. We are selling gas at $1.70 to $1.80 per 1,000 cubic feet, with a further reduction announced; and this last statement is probably the most interesting to your readers, and will show whether the management of this company is a success or not. To this may be added that the company's dividends are the same to-day as they were five years ago when gas was sold at $3.50 per 1,000 cubic feet.

Yours, very respectfully,
Frederic Egner.
Engineer.

Letter from Mr. Pratt.

Jamaica Plain, Mass., Dec. 19, 1882.

To the Editor American Gas Light Journal:

I have read in your paper of December 16th your criticism on the paper which I had the honor to present at the meeting of the American Gas Light Association, on "The Future of the Gas Interest," and I beg leave to take some exceptions thereto.

You say that I urged that the moral support of our customers was to be obtained "by paying small dividends, while my listeners held that the object would be more easily secured by supplying gas at a low price," and that you "incline to the latter opinion."

I must beg you to read my paper again, and see how incorrectly you have quoted me. I did not advocate the paying of "small dividends." I said that "the future success of the gas interest will demand the acceptance and use of every real improvement, the strictest economy in every department of expenditure, the utilization of our residuals by a combination of interests, so that much larger profits may be derived from them; the acceptance by stock-

holders of a reasonable and, at the same time, ample return upon their capital; no watering of stocks, and a larger division of the surplus earnings to their customers in a reduced price of gas." Again, I said, "I firmly believe that we command the position; we can pay fair dividends to our stockholders, and sell gas at a price that will defy all competition." Again, I said, speaking of the competition we may expect from the electric light, that "the wise course will be to anticipate that state of things, and prevent, by lower prices, the entering of powerful rivals into the field of illumination."

I am clear in the opinion that lower prices will not so reduce our earnings as to deprive stockholders of ample dividends. A reduction in price is always followed by an increased consumption, and companies that pay eight or ten per cent. dividends will continue to pay them; they may not, nor do I believe they should, lay by annually a reserve of ten to twenty per cent. A large part of this, I claim, belongs to the consumer.

Look at our best managed railroads—few of them pay over eight per cent., and with this stockholders are satisfied.

It is a fallacy to talk of the great risks incident to the supply of gas as a reason why gas stocks should pay larger dividends; there is not a railroad in the land that is not daily, I may almost say hourly, subject to far greater risks of loss and damage than are gas companies—the de-railment of a train, the destruction of a bridge, the mistake or carelessness of a train-despatcher, conductor, or switchtender may involve, as they have done, thousands of dollars of loss, and deprived stockholders of their dividends for a long period, and we read almost daily of these accidents occurring. How seldom do we hear of serious or fatal accidents connected with the eight or nine hundred gas works in this country.

I believe with you, Mr. Editor, in "lower prices;" but I do not believe that these prices involve "small dividends," and you will, if you read my paper again, see that it bears no such construction.

I was incorrectly reported as saying, in the discussion that took place at Pittsburgh, that "I did not believe the public would quietly submit to stockholders receiving ten per cent." What I did say was that in addition to a ten per cent. dividend the public would not be satisfied with our laying by "an annual reserve of ten per cent," and that is my opinion now. I think such a surplus is too large, and would warrant a reduction in the price of gas.

Your correspondent, "Manager," has written two rather rambling and somewhat incoherent articles, purporting to be replies to my paper, which I have read, and tried to put some points together in answer; but I find myself somewhat in the position of a juryman in one of your courts in Clinton county, who plead deafness as an excuse for not serving. Judge Hand, who presided, called him to his side, and said, "My good man, did you not hear my charge to the other jury a few minutes ago?" "Yes," he replied "but I could not make head or tail of it"—at which bench, bar and spectators were convulsed with laughter; and all I can say to your correspondent is that I "can't make head or tail" of his articles. He is evidently irritated, disgruntled, unhappy, and, therefore, petulant; and I will not aggravate his temper by attempting a reply. I think the process through which he is passing is a healthy one, and the further study of my paper will do him good; and while I do not expect him and many other equally intelligent managers to embrace my sentiments readily, I am confident that discussion, if it is carried on in good temper, will be productive of good.

It is true, as "Manager" says, that at the commencement and conclusion of my address I expressed the fear that my views would receive a very limited assent or approval; but I am happy to assure your correspondent, which I hope will not give further cause for irritation, that I have been most agreeably disappointed—at the meeting, and from a very large number of persons whose judgment and opinions I value, who were not present, I have received the most cordial and hearty endorsements of the views which he, very likely, thinks I had the temerity, if not audacity, to present.

Yours, very truly,
JOHN C. PRATT.

The Future of the Gas Business.

(No. 3.)

NEW YORK, Dec. 29, 1882.

To the Editor AMERICAN GAS LIGHT JOURNAL:

Mr. Pratt says: "We publish our reports and the people read them and are satisfied." It is a good thing for the people to be satisfied; but let us see why. Simply because he pays his stockholders but eight per cent. dividends. It would seem that they are perfectly willing to pay three dollars per thousand for gas so long as he pays only eight per cent. dividends. Following the same line of reasoning, perhaps they would be willing to pay three dollars and fifty cents per thousand, if when he published his report it showed that he earned only four per cent. He makes the sweeping assertion that "Gas companies are making more money out of the public than they have a right to make." The price at which gas is sold seems not to have so much to do with it, the economical management of the works does not attract so much attention, but if you can only show the people that you do not make much money, lo! and behold! they are satisfied. Suppose that Mr. Pratt should know a little more what other companies throughout the country are doing than he appears to; suppose he kept up with the times in regard to the manufacture of gas by procuring the most approved apparatus for his works and by economical management to be able to sell gas at two dollars and fifty cents per thousand instead of three dollars, and that when he made up his accounts should find that instead of eight per cent. he had actually made ten per cent. or twelve per cent., when he published his report, what would his position be before his dear public? Why, of course they would want him to put his price back to three dollars per thousand, for they could never be happy to know that he earned ten per cent. Again, he says: "Is it safe then to conclude that we have reached the end of discovery and improvement that will apply this wonderful, mysterious, unseen and incomprehensible power to illuminating purposes?" Suppose we step into the works at Jamaica Plain and see what our impression would be. As we have not, we cannot say; but when we go about the country and visit the many gas works and see the various kinds of new apparatus taking the place of the old, all tending and resulting in the production of gas of better quality and at steadily decreasing cost, enabling the companies to continue reducing the price to consumers and still earning fair dividends, we conclude that the end of discovery has not yet been reached.

Many companies are already turning their residuals to better account, realizing no inconsiderable sum from that source alone. Speaking of the incandescent electric light, he says: "The incandescent light, if it can be made as safe, as reliable, and be furnished as cheap as gas, will, if it does not drive gas from the field of illumination, receive a larger share of the business than we can well afford to lose." Is it not plain to all that when a light can be produced that is better, as safe, as convenient and reliable, and can be sold at a price less than gas can be sold, and at the same time make profit that will pay the interest on the necessary outlay, that gas will not be used. It is said that great improvements will yet be made in the electric light? That is doubtless true for there is need of it; but are not the possibilities in the field of gas manufacture equally as great and even greater? Very great improvements have been made during the past few years and still greater ones are in progress.

Many companies have reduced the price of gas during the last year. Reductions have been decided upon to take effect the 1st of January. Others are contemplating still further reductions.

Far be it from me to place an underestimate on the value of the moral support of the community. I believe with Mr. Pratt that the consumers have rights which gas companies are bound to respect. And I also believe that we are much better entitled to it when we attend strictly to our legitimate business, pay our employees fair and even liberal wages; for it is a business that requires and demands the utmost care, attention and watchfulness on the part of all who are engaged in it, not simply ten hours a day but all through the twenty-four hours and every day in the year, although Mr. Pratt would almost seem to lead people who are not acquainted with the business to think that it is little but play; by steadily keeping our works in the best possible condition so as to take advantage of any and everything that will improve the gas in quality and at the same time lessen its cost, hear all complaints reasonable or unreasonable, treat all with consideration, give all needed explanations without exhibition of temper, pursue a policy in management so that we need not be ashamed to show our books if necessary, and lastly, by keeping the property good and earning enough to pay our stockholders a fair return for the use of their money.

Suppose Mr. Pratt should hear that some of us who live hundreds of miles away from the coal fields had allowed our stock of coal to get so short as to be with less than a week's stock of coal on hand in mid-winter, when navigation was likely to be impeded by ice or a severe storm of several day's duration, as is very likely to be the case at this season of the year, and our neighbors could not or would not lend or sell us a few tons of coal, our consumers in blissful ignorance of the fact that at any moment they might be compelled to hurry to the nearest grocery for candles or kerosene lamps to keep them from utter darkness, however much we might write newspaper articles decrying the enormous profits of gas companies, we should not expect the directors of our companies or the community to give us much moral support; but without doubt railroad companies and telegraph companies would still go on pursuing the even tenor of their way.

While Mr. Pratt has put his ideas in such form as in my judgment will tend to create wrong impressions in the minds of the people with regard to the management of gas companies, as a rule, his intentions are, no doubt, good; and I think as I said in my first communication that the paragraph which I quoted embodies the gist of the whole paper, and it will not only bear repeating but should be printed in large letters, framed and hung up in the office as a constant reminder.

MANAGER.

THE AMERICAN
GAS LIGHT JOURNAL

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TUESDAY, JANUARY 2, 1883.

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.
(with W. B. Scott & Co.,)
34 PINE STREET, NEW YORK CITY

JANUARY 2, 1883.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share.

	Capital.	*Par.*	*Bid.*	*Asked*
Gas Co.'s of N. Y. City.				
Central	$466,000	50	75	85
Harlem	1,800,000	50	90	95
" Bonds	170,000			103
Manhattan	4,000,000	50	210	215x
Metropolitan	2,500,000	100	182	187
" Bonds	658,000	..	106	108
Mutual	3,500,000	100	105	107
" Bonds	1,500,000		100	102
Municipal	1,500,000	100	175	180
" Bonds	750,000		106	110
New York	4,000,000	100	110	115
Northern	270,000	50	90	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	108	112
Citizens	1,200,000	20	67	70
" S. F. Bonds	320,000	1000	105	107
Fulton Municipal	3,600,000	100	70	80
Peoples	1,000,000	10	40	45
" Bonds	290,000	.	104	107
" "	250,000	...	88	90
Metropolitan	1,000,000	100	67	70
Nassau	1,000,000	25	50	55
" Ctfs.	700,000	1000	90	93
Williamsburgh	1,000,000	50	50	55
" Bonds	1,000,000	...	100	101
Richmond Co., S. I.	300,000	50	70	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N.Y	750,000	100	72	75
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	—	—
" " Bds.	124,000	—	105	10
Chicago Gas Co., Ills			150	155
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			42	43
Bonds			107	—
East Boston, Mass	220,000	25	122	128
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	120	128
Halifax N. S	400,000	40	148	150
Hamilton, Ontario	150,000	40	117½	
Jersey City	750,000	20	155	160
Jacksonville, Ill	120,000	50	100	...
Lewistown Maine	400,000	100	—	100
Laclede St Louis Mo	1,200,000	100	117	—
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn		25	144	—
Oakland, Cal			32	33
Peoples, Jersey City		...	75	80
" " Bds.			...	...
Pittsfield, Mass			120	130
Rochester, N. Y		50	70	80
Wilmington, Del		50	174	...
Yonkers		50	30	32
St. Louis Missouri	600,000	50	250	254
San Francisco Gas-Co., S. Fr'isco Cal.			55	57
Toledo, Ohio			95	97
Troy, Citizens	600,000	100	—	—
Washington, D. C	1,500,000	20	200	

The Manhattan Gas Light Company have declared, on December 18th, a dividend of 5 per cent., payable on demand. 80 shares of Northern Gas Light Company's stock sold at auction at 42¼.

Advertisers Index.

Page

GAS ENGINEERS.
William Farmer, New York City ... 22
G. Warren Dresser New York City ... 21

GAS WORKS APPARATUS AND CONSTRUCTION.
James R. Floyd, New York City ... 19
T. F. Rowland, Greenpoint, L. I. ... 19
Delly & Fowler, Phila., Pa ... 19
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 19
Stacey Mfg. Co., Cincinnati, Ohio ... 19
Bartlett, Hayward & Co., Baltimore, Md ... 19
P. Munzinger, Phila., Pa ... 19
Morris, Tasker & Co., Limited, Phila., Pa ... 19
Davis & Farnum Mfg. Co., Waltham, Mass ... 14

GAS AND WATER PIPES.
A. H. McNeal, Burlington, N. J ... 18
Gloucester Iron Works, Phila., Pa ... 18
James Marshall & Co., Pittsburgh, Pa ... 18
R. D. Wood & Co., Phila., Pa ... 18
Warren Foundry and Machine Co., Phillipsburgh, N. J ... 18
Mellert Foundry and Machine Co., Reading, Pa ... 18

SCRUBBERS AND CONDENSERS.
G. Shepard Page, New York City ... 20
Jas. R. Smedberg, New York City ... 16

RETORTS AND FIRE BRICK.
J. H. Gautier & Co., Jersey City, N. J ... 16
B. Kreischer & Sons, New York City ... 16
Adam Weber, New York City ... 16
Laclede Fire Brick Works, St. Louis, Mo ... 16
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y ... 16
Borgner & O'Brien, Phila., Pa ... 16
Gardner Brothers, Pittsburgh, Pa ... 16
Henry Maurer, New York City ... 16
Evens & Howard, St. Louis, Mo ... 16
Chicago Retort and Fire Brick Works, Chicago, Ills ... 16
Taylor and Anderson, Cincinnati, Ohio ... 16

DIETERICH'S REGENERATOR FURNACE.
Charles F. Dieterich, Baltimore, Md ... 296

GAS STOVES.
American Meter Co., New York and Philadelphia ... 15

VALVES.
Ludlow Valve Manufacturing Co., Troy, N. Y ... 17

GAS METERS.
Harris, Griffin & Co., Phila., Pa ... 22
American Meter Co., New York and Philadelphia ... 23
The Goodwin Gas Stove and Meter Co., Phila. Pa ... 23
Helme & McIlhenny, Phila., Pa ... 23
Maryland Meter and Mfg. Co., Baltimore, Md ... 22
D. McDonald & Co., Albany, N. Y ... 22

EXHAUSTERS.
P. H. & F. M. Roots, Connersville, Ind ... 17
Smith & Sayre Manufacturing Co., New York City ... 17

GAS COALS.
Penn Gas Coal Co., Phila., Pa ... 21
Perkins & Co., New York City ... 20
Cannelton Coal Co., New York and Philadelphia ... 21
New York and Cleveland Gas Coal Co., Pittsburgh, Pa ... 21
Newburgh Orrel Coal Co., Baltimore, Md ... 21
Despard Coal Co., Baltimore, Md ... 21
Fort Pitt Gas Coal, Pittsburgh, Pa ... 21
Chesapeake and Ohio R.R Coal Agency, N. Y. City ... 21

GAS ENGINES.
Schleicher, Schumm & Co., Phila., Pa ... 296

STREET LAMPS.
J. G. Miner, Morrisania, New York City ... 13

PURIFIER SCREENS.
George D. Cabot, Lawrence, Mass ... 286

BURNERS.
G. Gefroer, Phila., Pa ... 18
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa. ... 24

PURIFYING MATERIAL.
Connelly & Co., New York City ... 17

STEAM BLOWER FOR BURNING BREESE.
H. E. Parson, New York City ... 286

PROCESSES.
Gwynne Harris New York City ... 18
Strong Gas and Fuel Co., Yonkers, N. Y ... 23

GAS FIXTURES.
Mitchell, Vance & Co., New York City ... 17

CEMENT.
F. O. Norton, New York City ... 17

BOOKS.
King's Treatise ... 20
Gas Analyst's Manual ... 21
Scientific Books ... 18
Cathels' Gas Consumers' Manual ... 23
Fodell's Book-Keeping ... 23
Review of Gas and Water Engineering ... 295

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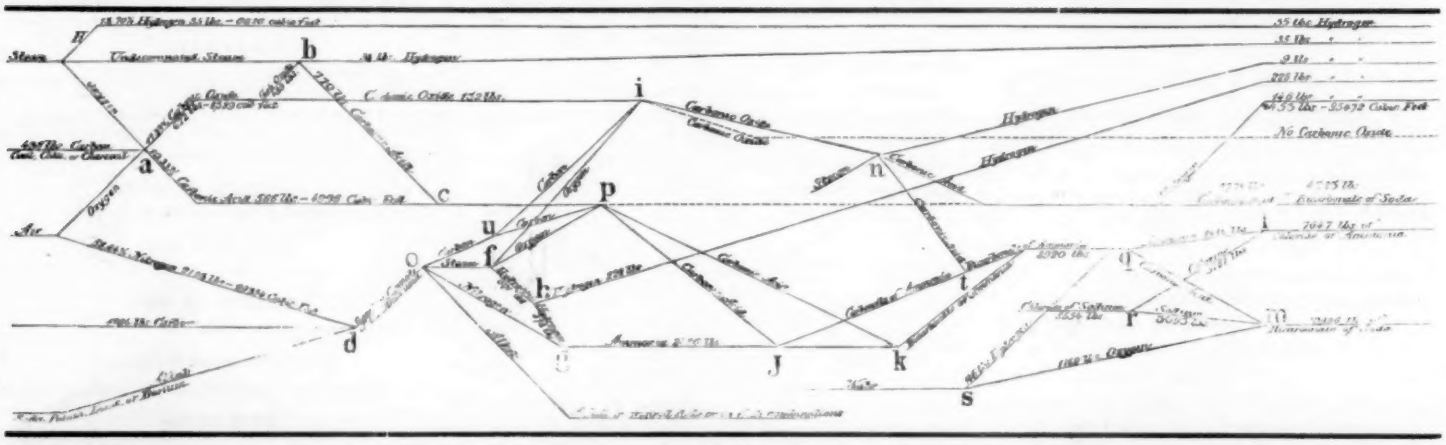

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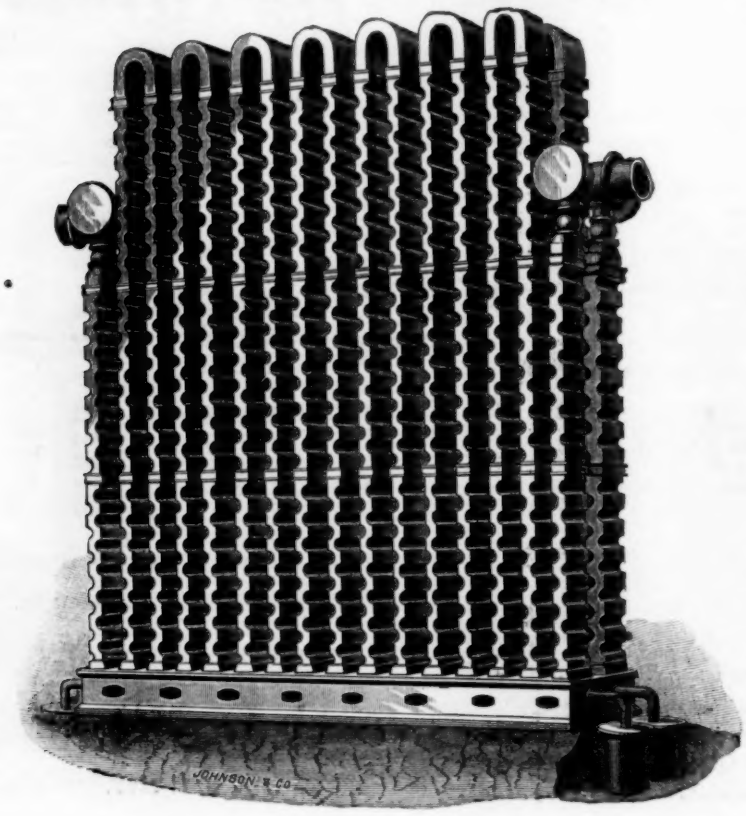

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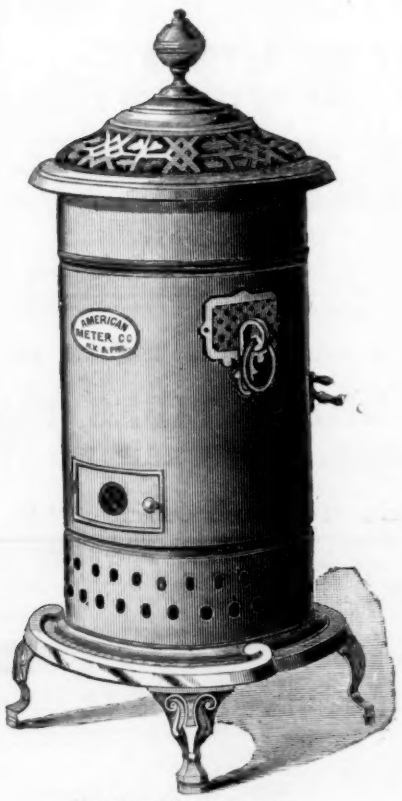

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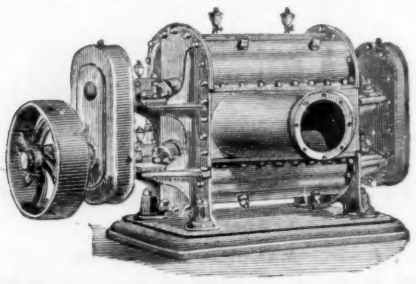

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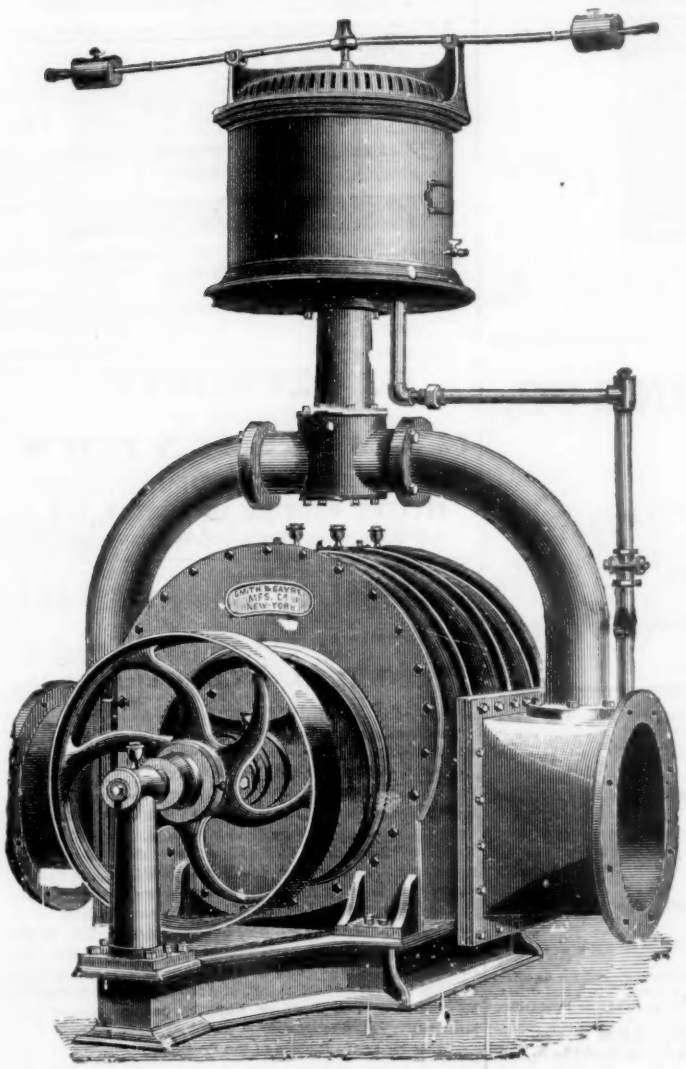

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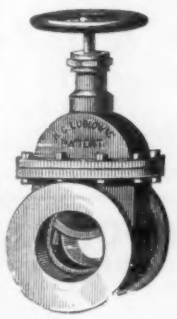

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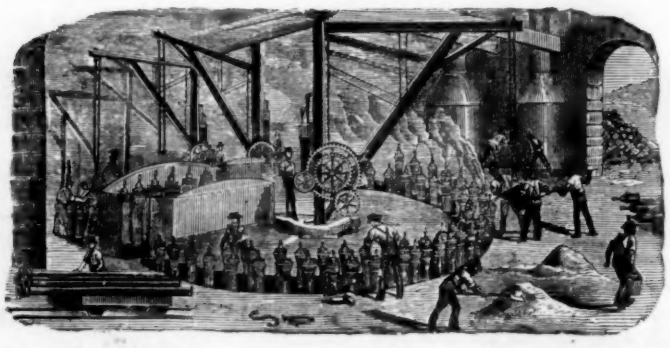

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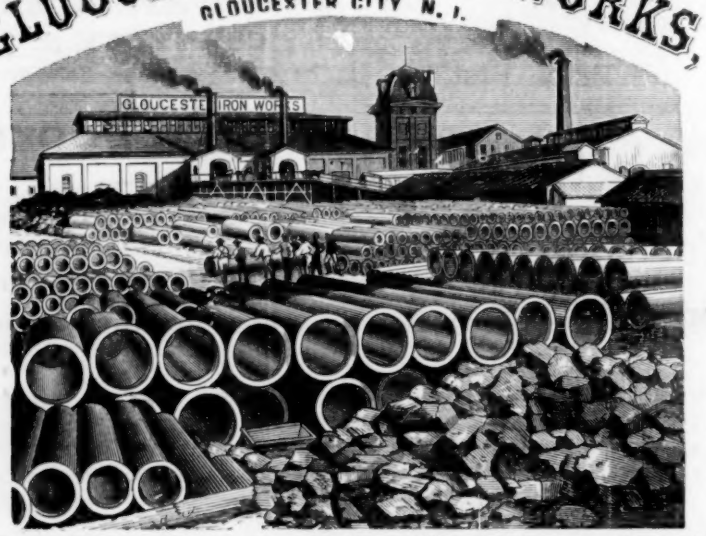

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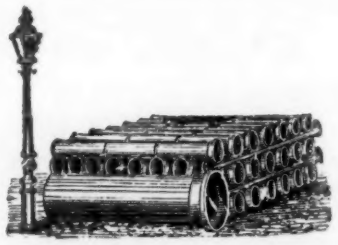

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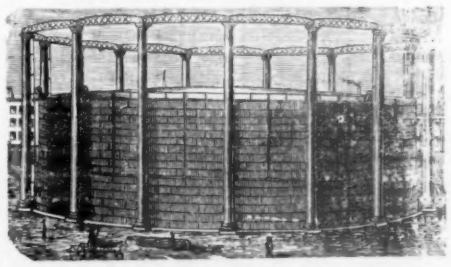

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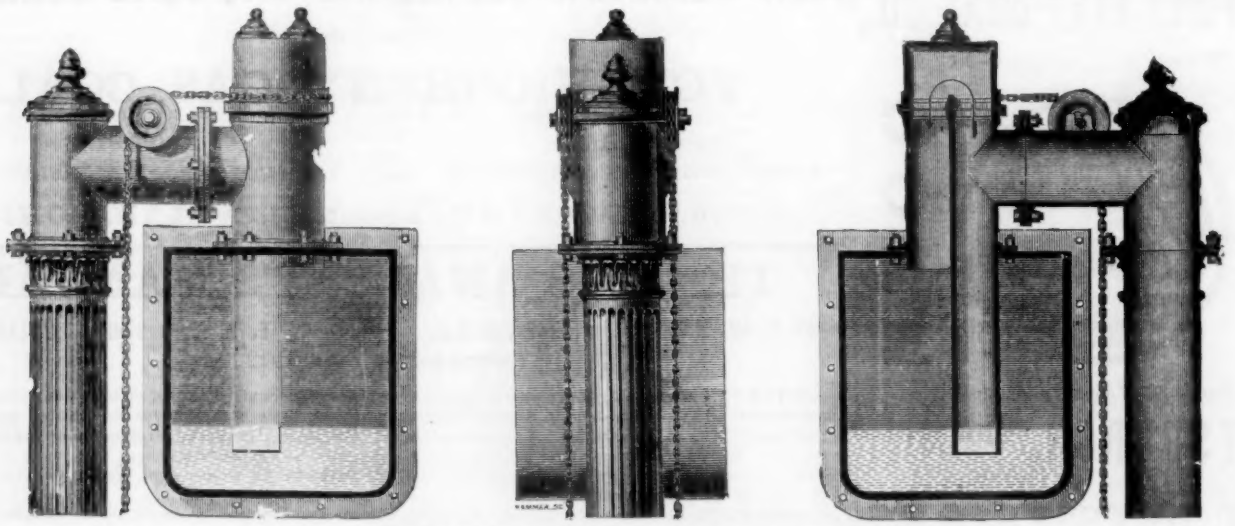

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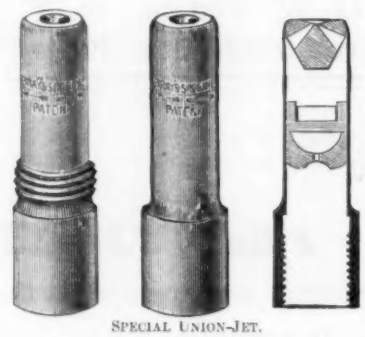

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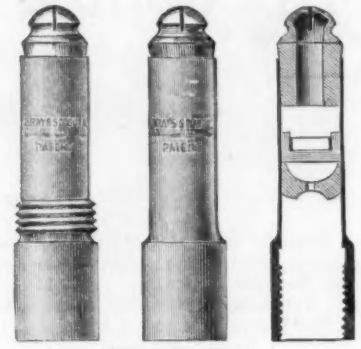

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The "Special" Burners, as improved, are more adaptable to the requirements of gas illumination than any now before the public. They can be made to suit any pressure or quality of gas (including air gas). The gas inlet is so placed that it cannot be tampered with, and they are not liable to get out of order.

The following table and sentences in quotation marks are taken from the report of S. C. Ford, the United States Inspector of Gas and Meters at Washington, D. C., for the year 1881:

Description of Burner.	Pressure at points of ignition.	Actual consumption of gas per hour.	Illuminating power in candles at rate of actual consumption.	Illuminating power in candles, at rate of 5 cu. ft. per hour.	Value of one foot of gas in terms of standard candles.
	Inches.	Cubic Feet.	Candles.	Candles.	Candles.
Bray's Standard Slit-Union (30 candles....	.255	6.50	30.04	21.76	4.35
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" " " No. 6.....	.50	4.10	16.61	20.25	4.05
" " " No. 5.....	.50	4.24	16.97	20.01	4.00
" " " No. 4.....	.60	3.49	12.58	18.02	3.60
" " Union Jet No. 7.....	.50	4.84	19.13	19.76	3.95
" " " No. 6.....	.55	4.32	17.10	19.79	3.95
" " " No. 5.....	.60	4.14	15.65	18.90	3.78
" " " No. 4.....	.55	3.38	12.04	17.81	3.56
" Regulator Union Jet No. 7.....	.50	4.99	17.69	17.72	3.54
" " " No. 6.....	.50	5.18	17.63	17.01	3.40
" " " No. 5.....	.60	4.37	13.71	15.68	3.13
" " " No. 4.....	.60	3.97	11.46	14.43	2.88

"On examination of the above table of tests, made with various burners, it will be observed that the illuminating power obtained with Bray's special burners Nos. 5, 6, and 7, both slit-union and jet form, was high; but with Bray's regulator burners only moderately good."

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